

STUDIES IN HORSE BREEDING

G. L. CARLSON

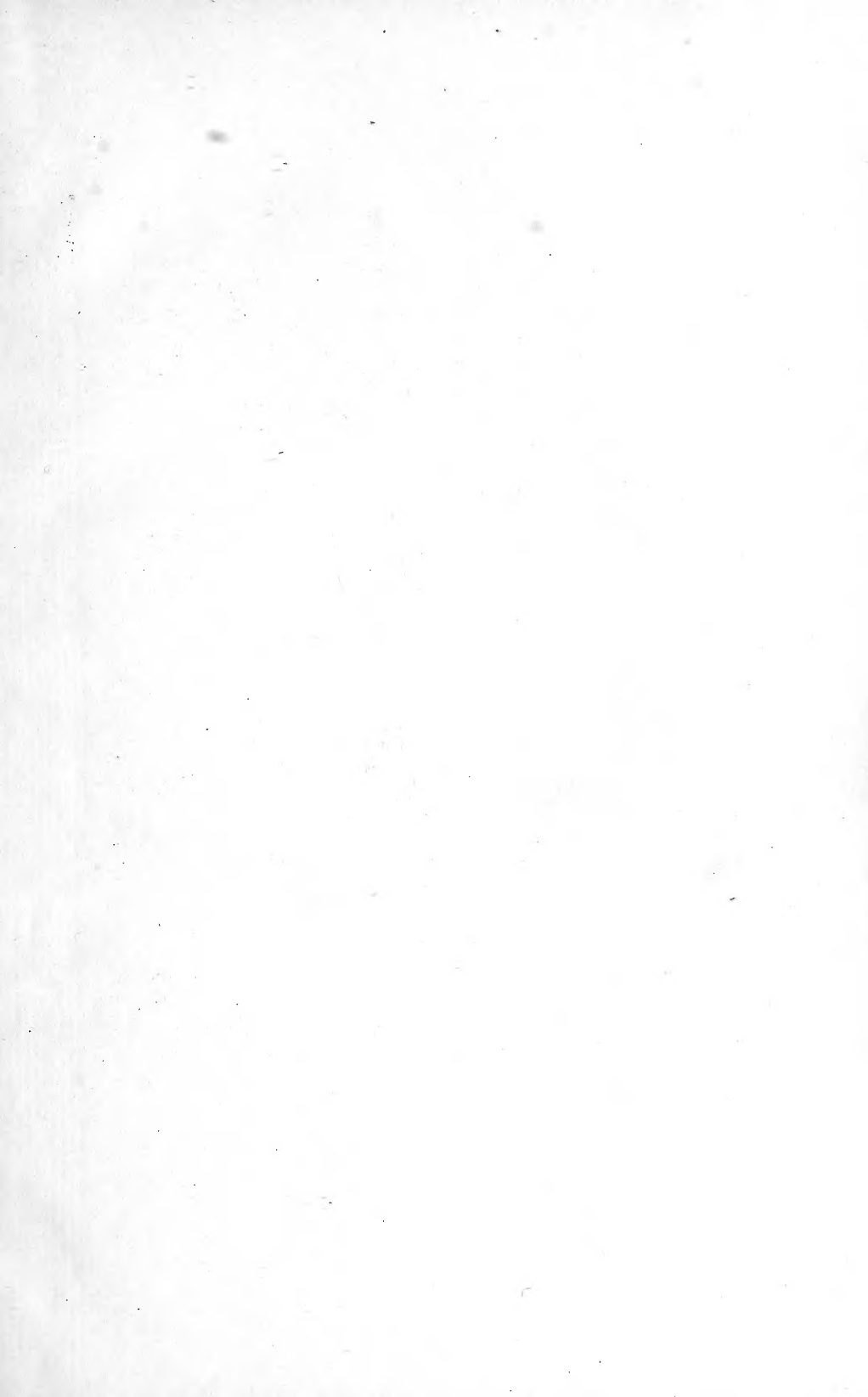


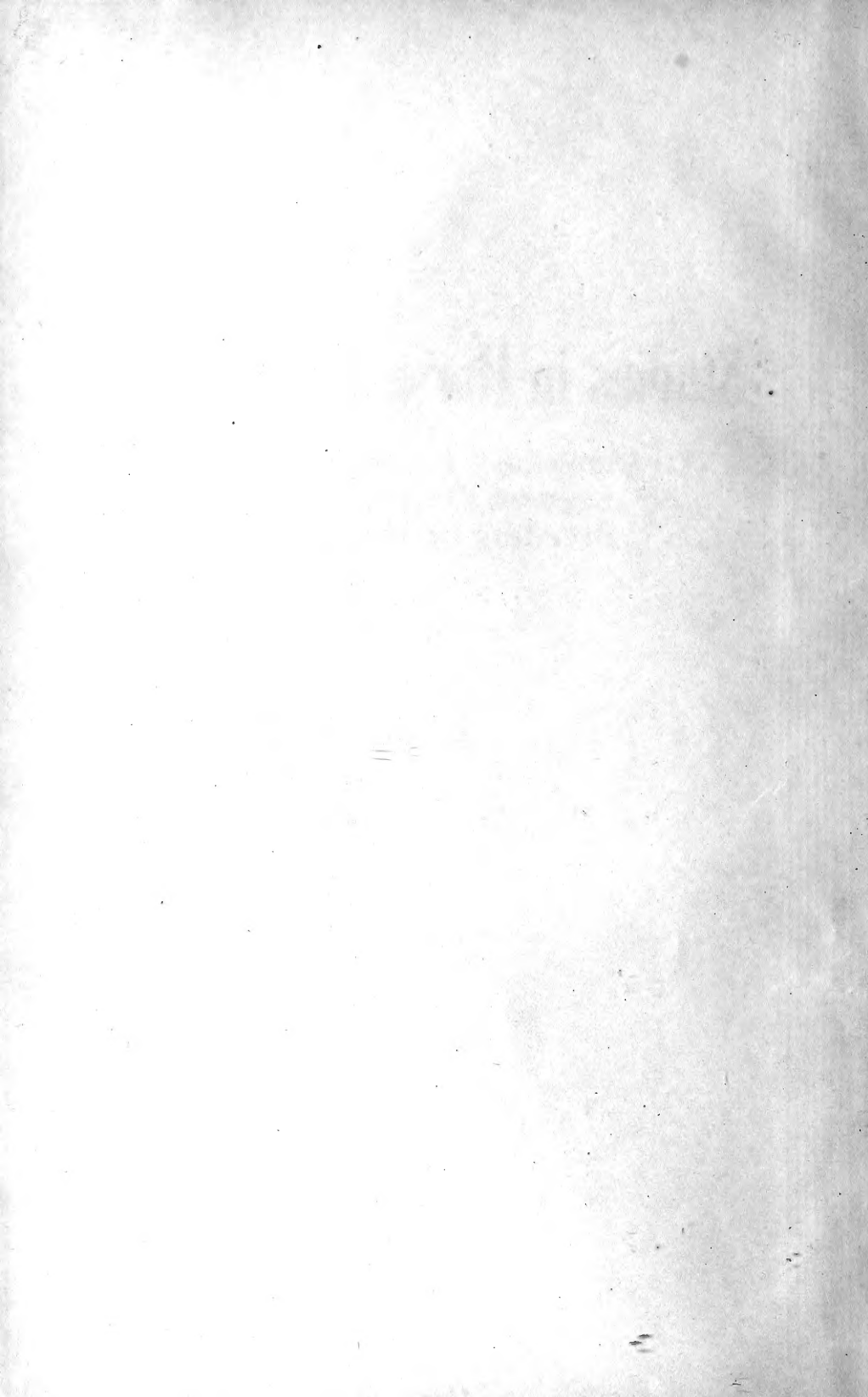
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Studies in Horse Breeding

An Illustrated Treatise on the
Science and Practice of the
Breeding of Horses

By
G. L. Carlson

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PREFACE.

Two classes of men only, have I had in mind in the preparation of this text; the farmer-breeder, and the stallion or jack owner. The chief object has been to help in improving the horses of this country, and to be the means, in a measure at least, of employing better methods in their production. Our methods have been wasteful throughout all the years of horse breeding in this country. This has reference to time lost, as well as the wasting of the vital energies of our best sires.

I have left nothing undone, to make brevity a striking feature of the text. It was at first my intention to publish a large volume, but when I considered the little time the average breeder has to give for such work, I believed it better to give "The most possible, in the smallest possible space," without sacrificing any of the vital facts bearing upon the subject.

No apologies are offered for the frequent reference to the draft horse. No one has a higher appreciation of the warm bred horse than the writer, yet the fact remains that the draft horse is the horse of, and for, the American farm. He can be produced as easily and cheaply as a steer, and will sell for three or four times as much. Then again, while I have made a few experiments with light horses in breeding, nearly all my work has been carried on with draft horses. It

is my own experience, and the statistics gathered by myself, that I am recording. I have spent much time, and a vast sum of money in such work, more I believe than has ever been spent in such work by all others together. One has only to consider some of the data collected to make this clear.

To make the text of the most practical value to the breeder, technical terms have been studiously avoided. A few terms in common use have been given a meaning not always accorded them. The term "foal" is used to indicate the produce of a mare up to weaning time, without regard to sex. A "filly" is a female foal, while a "colt" is a male foal. Barrenness has reference to an unfruitful mare, while sterility refers to an unfruitful stallion. This makes it possible for one to know whether a mare or stallion is intended by the text itself.

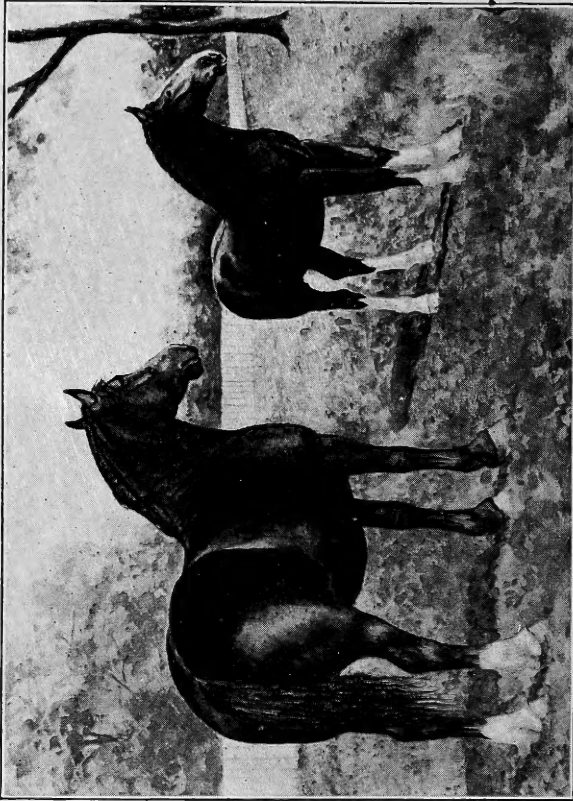
The kindly and courteous interest shown by the horse breeders in many states, in my investigations, have always been a source of much pleasure to me. I also feel indebted to many veterinarians throughout the country, for their many words and acts of encouragement. In this connection I wish to acknowledge my appreciation of the help extended to the horse breeding industry, by the Kansas City Veterinary College. Never before in the history of such education in this country, have a professional body of men done so much to help a great industry. The same appreciation is due the Editor of the Stallion and Jack News, of Kansas City, Mo. It requires a large fund of both moral courage and enterprise, to embark in a new and untried field of endeavor. This journal is devoted ex-

clusively, to the production of the best in horses and mules, and has taken a high position in advocating better methods, and the practice of higher business ethics, in their production.

After all is said, a work of this kind is the work of many, rather than one, and all who have helped by so much as an encouraging word, must share in its success.

G. L. CARLSON.

Norfolk, Nebraska, April, 1910.



TWO MEMBERS OF A ROYAL FAMILY

INTRODUCTORY.

No industry connected with the soil, or carried on in connection with the farms of this country, has yielded so liberal returns for the labor and money employed as the breeding of good horses. No live stock bred upon the farms of the United States has increased in value so rapidly, as horses and mules. In 1869 the value of all horses and mules owned in the United States was \$469,000,000. In 1899 the same live stock was valued at \$607,000,000. At the present time the same live stock has reached the enormous sum of \$2,500,000,000.

Although the breeding of horses and mules is now one of our most profitable industries, yet little has ever been done in a public way to encourage it, by either the Federal or State Governments, or to aid the farmer and breeder in adopting better methods of producing them. Bulletins without number, upon other subjects of much less importance have been annually forthcoming, yet nothing upon that of producing better horses, or of using more economical means in their production.

The same is true of individual help, in the way of breeding horses. No embryologist has ever made a special study of the horse. There are reasons for this. The great Teutonic race has furnished the most eminent embryologists. In their native land, even more

than elsewhere, horses have always represented too high a value to be sacrificed for such purposes. Mares dying and which could be had for investigation of this kind, were usually non-breeders, because of old age. So far as the horse is concerned, how the ovaries perform their various functions; how, when, and where conception takes place; or of the early development of the foetus and foetal membranes, nothing is really known.

The world's urgent need today, is for more men with special training to carry on its great work. In its last and best analysis, the business of breeding horses does not differ from that of any other. Only those best fitted, best equipped for the business shall survive. No rapid progress in producing better horses, need be expected, until more scientific means be employed in producing them.

Then again, I believe one is justified in appealing to the civic pride of the country, which is more or less developed in all mankind, upon the question of producing better horses. I have observed that throughout all the rural world, the best and highest type of citizenship is always to be found in the districts of the best bred stock. To improve the live stock of a country, is a potent means of raising the standard of its citizenship. The production of high-class animals, calls into activity intelligence of the highest order.

No country is better fitted by reason of its climate; its nutritious grasses; its abundance of grain; its pure water; and the high intelligence of its breeders for the production of high-class horses, than a large part of the

United States. No better evidence of this is needed than the fact, that in nearly all the breeds we have produced many specimens, unsurpassed in any country, and what can be done by a few breeders can be done by others.



CHAPTER I.

CONCEPTION.

How Life Begins. Conception has been defined by most writers as being the union of two cells. It is more; it is the beginning of a life. This life principle is a creation of the stallion. It is the stallion who ushers into being this new life. The mare completes this life. Every organ, as well as the true entity of the future horse is the gift of the stallion; yet this new life absorbs quite as many impressions from the mare during its foetal existance, as it received at its creation from the stallion. The stallion endows this new life with every organ and function of the future horse—brain, eyes, thorax, nerves, muscles, generative organs and all; yet during its foetal life, it absorbs quite as much of the individual character of the mare, as it received from the stallion at its creation.

The Creative Forces of Nature. All that has, or ever will be known of the origin of life, is based upon this one fundamental truth: All forces of Nature are divisible into two classes, those that are creative and those that are destructive. Conception must be the result of the creative forces of Nature. Life must have its beginning, a primal prerequisite of all things. This the stallion supplies in the form of semen, in which we

find spermatozoa. They are organized. Another fundamental truth in the science of life is that no where can we find where Nature has ever given us a part of a whole. These spermatozoa have heads, they have tails, they have thoracic structures. We can see them move,

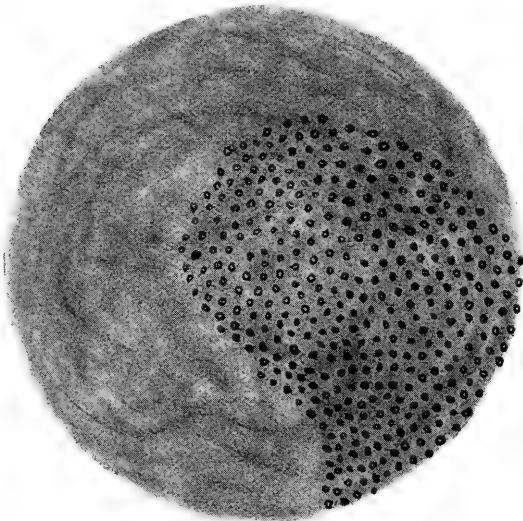


Figure 1. The semen of a sterile stallion, showing seminal granules, or corpuscles, but no spermatozoa. (Sketched.)

hence we know they have muscles and nerves. To have brains, and thorax, and muscles and nerves is enough to know that they have all other organs.

Spermatozoa. If, however, I was asked to describe in a general way of what the seminal fluid of a stallion was composed, I would reply by saying that it consists of a multitude of minute bodies, about 1-1200

of an inch in diameter, and 1-300 of an inch in length, and presenting great activity in their motions. These are floated in the liquor seminis, a homogeneous fluid, in which we observe minute rounded corpuseles, the seminal granules, shown in figure 1. These vary greatly in size in the semen of different stallions, and in some



Figure 2. Spermatozoa of the stallion, showing clusters of the large granules. (240 diameters.)

stallions we find two kinds of granules, differing widely in size. In some instances, a magnification of 200 diameters will disclose small clusters of granules, of two to a dozen granules in a cluster, and appearing sufficiently large with that magnification to be counted. These are shown in figure 2. If this semen be placed under a higher magnification, the smaller granules

found in all semen will be disclosed as shown in figure 1. These smaller granules are about 1-2000 of an inch in diameter.

Relative Size of Spermatozoa. In twenty-seven years of investigation, I have never found two spermatozoa of the same size, even in the same discharge, when

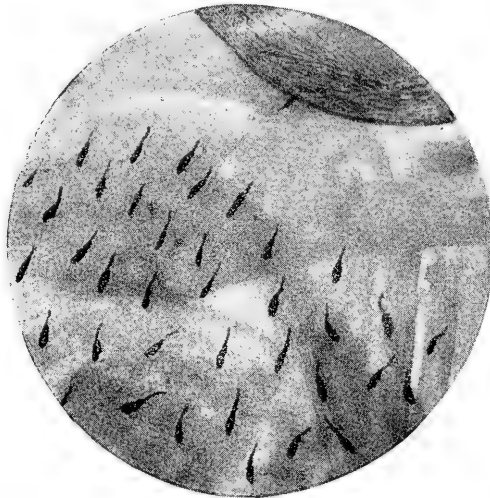


Figure 3. The beginning of a life. Spermatozoon entering the ovum of the mare.

measured with the photo-micrograph. The size of the stallion has little to do with the size of the spermatozoa. They are relatively larger in small stallions than in large ones. An imported Shetland stallion weighing 350 pounds, discharged spermatozoa about one-half the size of those from a Shire stallion weighing 2250 pounds, nearly seven times as large as the pony. The

spermatozoa of Shire stallions are slightly larger than those of any other breed. Figure 4 shows a spermatozoon greatly magnified. For the benefit of those who have never had any experience with work of that kind, I will say that Photo-micrograph shows a smaller diameter than appears to the eye with the same magnification.

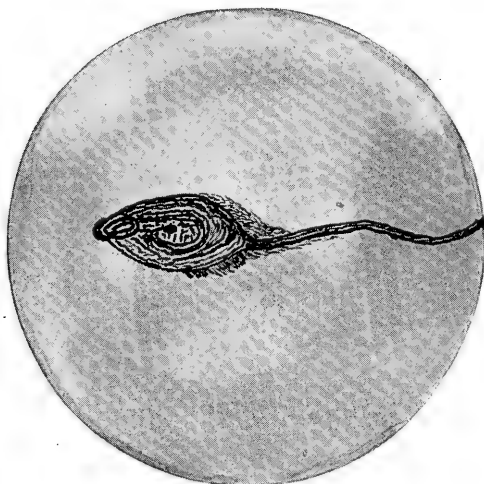


Figure 4. Spermatozoon of the horse. (Greatly magnified.)

The Sexual Organs of the Stallion. The origin of spermatozoa will require some study of the generative organs of the stallion, the most important ones being shown in figures 5 and 6. Semen must have its starting point. This is in the testicles, which are composed of smaller glands, numbering into the hundreds in cases of great sexual vigor. These glands are conical,

with their apex pointing upwards, forming a duct to carry secretions along until all merge into a smaller number of principle ducts, now ascending and emptying into the endidymis, which now doubles upon itself, working back and forming the vas deferens. The vas deferens or great duct, ascends through the inguinal ring, where rupture or hernia sometimes puts in its appearance. This semen is now floated around the

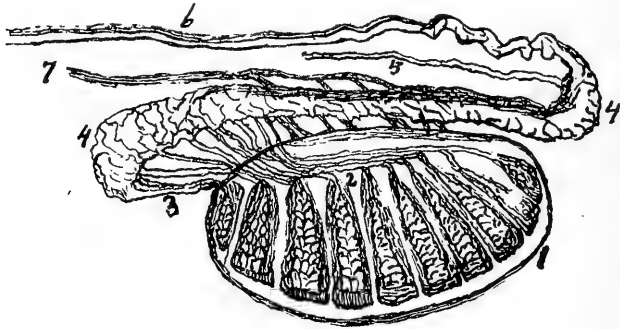


Figure 5. The testicle of the stallion with other glands dissected of their serous covering: 1, testicle; 2, the secretory glands; 3, vasa efferentia; 4, endidymis (epididymis); 5, vas aberrans; 6, vas deferens; 7, spermatic artery.

bladder, in order to be vivified, or given life, by the secretions of the seminal vesicles, a couple of glands located upon the bladder. Before these life germs receive this fluid, they show no signs of life. They also receive another fluid from the prostate gland. As to the true origin of spermatozoa, I have yet to ever find one in the testicles of a stallion. I do not wish to be understood as saying they do not originate there,

yet in many years of eager effort in that direction, I have never been able to find one there. Many others report finding them there, but I never could. I have, however, found them all the way from the endidymis to the prostrate gland, but never showing signs of life, until the seminal vesicles are reached. This has been

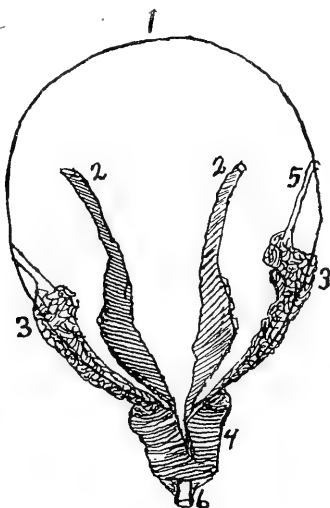


Figure 6. The secretory glands upon the bladder dissected of their serous covering: 1, bladder; 2, 2, vas deferens; 3, 3, seminal vesicles; 4, prostrate gland; 5, ureter; 6, urethra.

one of the unfathomed mysteries to me, since by removing the testicles, the stallion is soon made sterile; yet I have found the semen of a horse fertile eleven days after castration

Nourishment of Spermatozoa. The master passion of spermatozoon life is appetite, as is evidenced by every

act and movement. There is no question concerning the fact, that they receive their nourishment by absorption both before and after conception. The tail as it appears during its spermatozoon life acts as a rudder and means of locomotion to aid it in moving about, and for want of a better term, I will call it a temporary necessity, as it is lost at conception. This fact is shown at figure 3.

Vitality of Spermatozoa. The life force of spermatozoa depends much upon the sexual vigor of the stallion from whence they came. They are known to retain their vitality for thirty days. In dissecting a mare that had been killed at a railroad crossing 27 days after she had been bred, I found thousands of live spermatozoa in the vagina, uterine cavity and intestinal cavity. In this case, conception had taken place, I should say about three weeks previous. I have kept them under artificial conditions for fifteen days. At the end of this time, I found every spermatozoon active and apparently vigorous. However, I made many failures before I succeeded in doing this. To succeed in keeping spermatozoa alive for any considerable time, one must prevent them from coming in contact with either light or air. The bottle or tube they are to be kept in must first be sterilized with boiling water. If kept in jar, bottle or culture tube, these must be black so as to exclude all light. My success in this came as a result of filling and sealing a small black bottle from the vagina of a mare that had just been served by a stallion. I believe the vitality of spermatozoa depends very much upon the period of gestation

of the genus to which they belong. In testing the vitality of the spermatozoa of rodents, under artificial conditions, I found they would keep only a few hours. Canines a little longer. Swine two days and sheep three days. Experiments testing the longevity of spermatozoon life with regard to color resulted in red being next below black, then yellow, green, blue and white.

Bacteria Destroy Spermatozoa. Light, air and bacteria are the three most destructive forces of spermatozoon life. I have found some forty species of bacteria destructive of spermatozoa, some of them proving fatal to their existence instantly. The direct rays of the sun will destroy them in less than a minute. Figures 2 and 3 are good illustrations of the effect of air and even a shaded light. Figure 2 shows spermatozoa about 30 minutes after they were discharged by the stallion. The bend or curve in the tails of all, is evidence of their mobility and vitality. Figure 3 shows spermatozoa from the same discharge about six hours later. All showing with heads one way (from the light) is evidence that the light was painful to them. As all are straight is evidence motion had about ceased. Very soon after death, they mysteriously disappear as a result of some unseen agency.

Number of Spermatozoa In One Discharge The number of spermatozoa in one discharge of a stallion is anywhere from 10,000 to 75,000, depending upon the sexual vigor of the stallion, and the frequency of service. A good vigorous stallion upon one service per day will discharge from 50,000 to 75,000 of them at one

discharge. The amount of fluid discharged at each service of a stallion is from four to twelve ounces. The

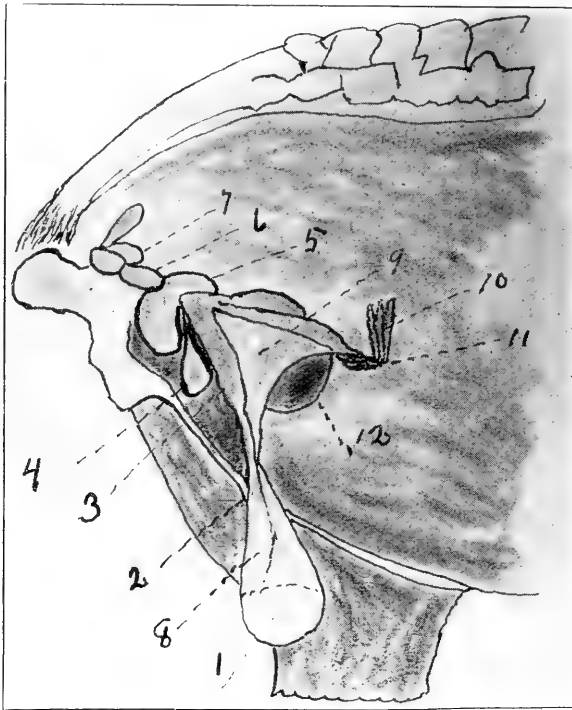


Figure 7. The genital organs of the stallion, shown from the right side: 1, right testicle; 2, 3, vas deferens; 4, seminal vesicle; 5, prostate gland; 6, urethra; 7, Cowper's glands; 8, fold of peritoneum; 9, vessels and nerves of left testicle cut off; 10, abdominal ring; 11, urinary bladder.

less frequent the service, the larger the amount of fluid, and the higher the number of spermatozoa.

Jacks. Jacks do not discharge as much fluid as a stallion, nor does this fluid contain as many spermatozoa. The spermatozoa of jacks are not as tenacious of life, as those of stallions. Scientifically speaking, no jack is as sure a breeder as a sure stallion. This is especially true when mated with mares, as the producing of hybrids is never as certain in the case of all animal life, as when the mating is of one species. There is a widely distributed belief to the contrary, but it is an erroneous one. Because of their temperamental difference, jacks make more complete service than stallions; that is to say, they deposit the semen in the uterus more often than stallions. This better service would result in a larger foal production, even with a lower vitality of the spermatozoa.

The Mare, As a Factor in Conception. Thus we learn that the stallion creates. It is he who originates life, while the mare furnishes the surroundings and support for the development of the embryo. Some place in which to be is as indispensable a condition of material existence as magnitude or form. Nothing can be, without being somewhere. This life germ must have some place in which to develop all its delicate organs. It requires both protection and warmth, as well as nourishment. This receptacle must be something which can receive and hold that seminal liquor in which it is floated from stallion to mare. Nature has very wisely provided the uterus of the mare for this important work. But this is not all, for in addition to this, the mare's nature in a measure, both organic and mental, must be incorporated in with its mental and

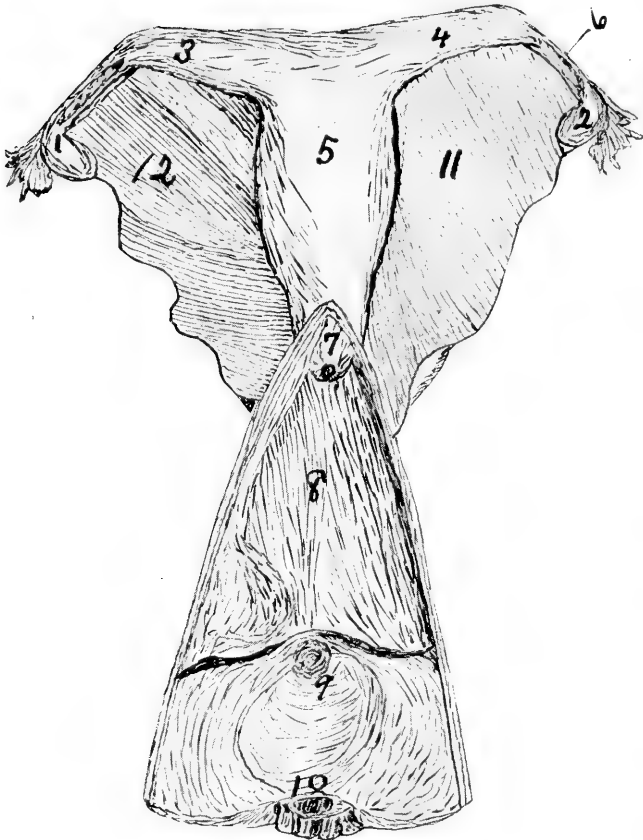


Figure 8. The genital organs of the mare: 1, 2, ovaries; 3, 4, horns of the uterus; 5, body of the uterus; 6, fallopian tube; 7, cervix, or mouth and neck of the uterus; 8, vagina; 9, meatus urinarius, or vent of bladder; 10, clitoris, or female penis; 11, 12, broad ligaments.



Figure 9. Ovary, fimbria, and fallopian tube of the mare.

principal organic structure. This leads up to another thought; to another step toward the beginning of a life. This step in the evolution of a life, calls for the ovum of the mare. A study of the ovum and germ cell of the mare, will require some knowledge of her genital organs, which are shown in figure 8. So far as conception is concerned, the ovaries are the organs of

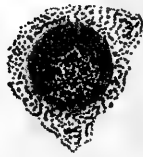


Figure 10. The ovum of the mare. (Five diameters.)

chief importance. In shape the ovaries resemble a lima bean, and are attached to the broad ligaments. They are the mare's first essential female element. Beneath their serous covering, lies their main substance, the tunica albuginea. This is a fibrous tissue full of blood vessels, which executes their chief function by developing numerous small, round transparent vesicles in

various stages of growth, known as the Graffian, which in turn develop the ova.

The Ovum. The ovum is a small roundish sack of food, composed chiefly of albumen, and containing all the materials of nutrition and growth required by the foetus for about 28 days after conception, and shown in figures 10 and 11. Its outer wall is known as the

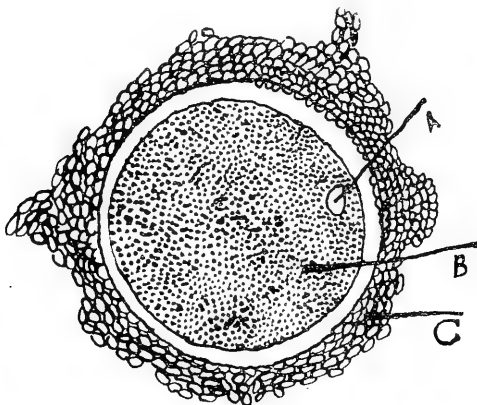


Figure 11. Ovum of the mare, cross section. A, germinal vesicle; B, yolk; C, zona pellucida.

zona pellucida. The contents of the ovum are, the yolk, which is yellow and is very finely granular; the germinal vesicle, representing the nucleus; and the germinal spot, which is the true germ cell. We sometimes hear the ovum spoken of as the germ cell, but the true germ cell is only a small part of the ovum. These ova mature in continuous succession from as early as the seventh month, to the end of the mare's usefulness

as a breeder, which sometimes continues for thirty years. The size of the ovum varies greatly in different mares, averaging about 1-12 of an inch in diameter. The size of the mare has nothing to do with the size of the ovum matured and discharged. I have found them all the way from 1-40 of an inch, to 3-8 of an inch in



Figure 12. Spermatozoa attracted by an ovum.

diameter. The germinal vesicle and the germinal spot, do not vary in size to any great extent. The germinal vesicle is about 1-150 of an inch in diameter, while the germinal spot is about 1-1500 of an inch in diameter.

Ovaries Authorities have so differed, in fact so little was really known of the natural laws regulating the heat periods, that I purchased 107 pony mares, to be used for the purpose of ovarian studies. The first

thing I gave my attention to was the time the ovum was discharged, with reference to the heat period. From twelve to fifteen of these mares would be taken up and used at one time. They would be tried with the stallion daily, until two heat periods had passed, that a record of these periods might be kept, both as to frequency and duration. The first day following that upon which they would refuse to mate with the stallion, they would be put to death and the ovaries examined. Only in one case out of the hundred mares did I find the ovum had been discharged, before the heat period had passed. This one was the case of an irregular mare, one that was irregular in her heat periods. Here we have very conclusive proof that it is the development, rather than the discharge of the ovum that produces the heat period. Only in one of the hundred mares did both ovaries mature an ovum during the same period. In other words, one out of the hundred mares would have produced twins if bred. Therefore it is safe to say that only one ovary acts, or develops an ovum at each heat period. Of all the ova I have ever examined, I have never found two germinal spots in the same ovum. Two years previous to this investigation, I removed the right ovary from ten mares, and the left from ten other mares. This was done in October. The following spring, I began trying these mares daily, and continued the record three months before breeding them. Seventeen of the twenty mares came in heat every 42 days, one of them every 28 days, and the other two in every 21 days. The second year only seven of them went 42 days between

heat periods, and the third year, only one of them.

Union of Spermatozoon and Ovum. We have now completed another step in the process of creating a new life, and a very important step. We have learned from whence comes the life germ. We have learned from whence comes the germ cell, or foetal home of the embryo life. The most important step and the one most interesting to students of the science of life, is the union of these two forces. This necessarily calls forth another of those fundamental truths. All animal life is carried on by the positive and negative forces of sexual magnetism, or electricity. The spermatozoa are positive. The ovum and germ cell are negative. Place an ovum of a mare in the fertile semen of a stallion, and watch the results. Under normal conditions, it seems impossible that conception could be prevented. About one-half of all spermatozoa within a certain distance, without regard to direction will at once start for that ovum, and all will work themselves around to the side against which the germinal spot is located. The ovum is to them such a magnet, that it seems impossible for any of them to break away from its influence. In all my experience with work of this kind, I have never seen any of the spermatozoa turn their heads away from the ovum, until conception takes place, when all at once they can all be seen to turn away from it. There is an actual visible strife as to which one is to be favored with admission to that ovum and cell. Finally one is successful, he has found the tube or duct leading to the germ cell. As a result of both magnetic attraction and force, he

enters therein, and a new life is begun. See figures 12 and 3.

Artificial Conception. There is one more thought referable to this subject, and one that is of interest, both to the breeder and student. Is artificial conception possible? It was only a few years ago that many people believed artificial insemination impossible. Today, the best and most progressive breeders throughout the horse-breeding world, are using that method in their breeding business. Since these terms may be new to many, to define or explain them will not be out of place. By artificial insemination is meant, the impregnation of the mare without the direct agency of a stallion, the most general plan being by what is known as the capsule method. Artificial conception is the beginning of a new life, and development of the foetus, without the direct agency of the mare. Artificial insemination has a large economic value, while artificial conception has no such value, not even being practical, yet it has a scientific value all its own, in explaining a way many breeding mysteries, which might never be so fully explained in any other manner. It is too expensive to be practical, even for experimental work, since a mare must be destroyed to obtain an ovum capable of being impregnated. If light, air and bacteria are guarded against with scrupulous care, artificial conception is more certain in its results, than artificial insemination. It would require a very expensive plant to nourish the foetus to maturity, but I have many times continued life and development to around thirty days, the longest time being 33 days.

These experiments were carried on with a culture tube only. Usually the ovum contains sufficient food to nourish the foetus for 28 to 33 days. As soon as the act of conception was completed, I would place the foetus in a culture tube, in which had been prepared a solution of salt, about 75-100 of one per cent. I have made enough of these artificial conceptions, that I



Figure 13. Embryo of the horse, artificially conceived.

have had them for examination upon every day from the third to the thirty-third. At about the thirty-third day, the sex character becomes observable. Figures 13 and 14 are foetuses artificially developed.

Placenta. One observation I have made enables me to announce that the skin of the ovum (*Zona Pellucida*) becomes the placenta of the future foetus. That

there is any connection of the circulation of the blood between the foetus and mare, need no longer be believed. Nourishment can be supplied by absorption only. If any still doubt this fact, let me ask them how nourishment is supplied in cases of extra uterine conception. I have known of three mares conceiving thus, one foetus being carried by the mare for eleven months

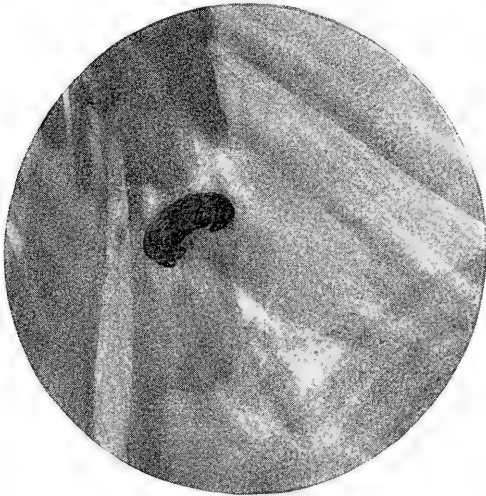


Figure 14. Embryo of the horse, artificially conceived.

and three days from the last service of the stallion. This foetus was well developed and of normal size, but thin in flesh. Even as regards intra uterine conception, the foetus is not always attached to the membranes of the uterus. Such cases are quite common. Many of the readers of this chapter have owned mares which produced foals in this manner. Such a condition can

always be recognized if one is present when the mare gives birth to her foal, by the fact that foetus and placenta are expelled together. In such cases, if one is not present to open the placenta, the foal will soon smother. I have carefully examined both placenta and the mucous membranes of the uterus in such cases, and found no evidence whatever of any attachment. A mare carrying and nourishing her foetus in such a manner is more likely to abort, than when the foetus is carried in a normal manner. I believe that 90 per cent of the cases of accidental abortion are of such a nature. In nearly every case of accidental abortion, the placenta is expelled intact with the foetus.

Observations on Conception. The year following that in which experiments were made in ovarian studies, reference to which has already been made in this chapter, I conducted experiments in conception with another hundred mares. Some of these were destroyed for the purpose of obtaining the ovum, with which to carry on further experiments in artificial conception. Others would be bred by the capsule method and destroyed from five to sixty days later, but always upon a day that was a multiple of five. To have a thorough understanding of the law of conception, will again make it necessary to refer to the genital organs of the mare, as shown in figures 8 and 9. The more we study these organs and their varied functions, the more the wonder, not that so few foals are produced, but that there are so many. There is no tube or duct to convey the ovum from the ovaries directly to the uterus. The fallopian tubes are very narrow in their

middle portion, but are much wider at their anterior extremities. This anterior or forward extremity is the true orifice of the fallopian tube, and is provided with several finger-like projections, known as the fimbria. It is the office of the fimbria to catch and hold the ova, as they are discharged from the ovaries. By contraction and continued pressure, as a result of this contraction, the ovum is forced backward through the fallopian tube into the horn of the uterus. In case of paralysis, or other failure on the part of the fimbria to perform their function, there is nothing to prevent the ova from falling forward into the intestinal cavity. If spermatozoa have been introduced into the uterus of the mare, they too, can work themselves upward and forward through the fallopian tube, and thence into the intestinal cavity. Should they come in contact with an ovum which has dropped forward into this cavity, conception will be the result there, just as readily as if it were in the uterus. In this event we have an extra uterine conception. In case the fimbria properly perform their function, conception may take place very soon after the ovum has been discharged from the ovary. But in all the observations made, conception took place nearly every time at the narrow place in the middle of the fallopian tube. Only once was a fertilized ovum found in the uterus, within fifteen days after semen had been introduced into it. In one instance a foetus was found in the middle, small portion of the fallopian tube 30 days after breeding. In this instance conception must have taken place very soon after semen had been introduced into the uterus, for the foetus was as large as a bee. When the ovum

discharged is unusually large, I believe conception aids, rather than retards its passage through the fallopian tube. The contraction of the fallopian tube behind will cause the foetus to work forward as a result of its own growth. I have never found a foetus attached to the walls of the uterus during the first fifteen days following service, except in the fallopian tube.

Several times in dissecting mares that have refused to breed, I have found a tumorous growth in the middle of the fallopian tube, which I have every reason to believe was the result of ova lodging there, and which the system of the mare had failed to absorb, thus permanently closing those tubes.

The vitality or life of the germ cell in the ovum, will last from five to seven days. It may be capable of fertilization some longer when kept under natural conditions, but the sixth day was the longest I was ever able to keep one in a condition to be capable of fertilization.

First Lessons in the Origin of Sex. The most interesting experiments in the study of creative science are those of conception. Figures 13 and 14 show foetuses resulting from artificial conception. Some of the deepest mysteries concerning the origin of a life, quickly disappear as a result of artificially produced impregnations. No sooner is an ovum placed among spermatozoa under proper conditions, than mysteries begin to fade. Here is given us our first lesson in the origin of sex. In most instances only 25 to 75 per cent of the spermatozoa will be attracted to a given ovum. To these the ovum is such a magnet that it seems impossible for them to re-

sist it, or to turn away from it. I have never yet observed one to be able to turn from it. Its head is always to the ovum, yet the instant conception takes place, the ovum has lost all its magnetic influence over the others. Place another ovum from another mare of a different magnetic temperament among these same spermatozoa and one observes an entirely different number of spermatozoa that are attracted to it. The first ovum will attract one sex of the spermatozoa, and the other ovum will attract only the other sex. The ovum from a mare very negative in character will attract only the male spermatozoa. The ovum of a mare very positive in character will attract the female spermatozoa only. The ovum of a passive or neutral mare has but little attraction for spermatozoa of either sex, and may be impregnated with either. This explains why some mares never produce but one sex, while others produce both. It also explains why some stallions sire a high per cent of one sex. I owned one imported stallion that in six years sired 81 per cent of fillies, while another in a service of four years sired 76 per cent of colts. In the case of both stallions, the per cent was practically the same every year. This is an inherited tendency.

An ovum and a spermatozoon may be so magnetically alike that there is no attraction between them. A very positive mare often fails to settle when mated with a very positive stallion, but settles at once when mated with a less positive one.

CHAPTER II.

THE FOETUS AND FOETAL MEMBRANES OF THE HORSE.

In writing the preceding chapter I had in mind the breeder only. I studiously tried to portray Nature's plan of conception in a manner to interest him. I can appreciate that such a portrayal would have little interest to the student or embryologist. While the text throughout this work will be written with a view to meeting the requirements of the breeder and stallioner, this chapter will be in part an exception. This has been made necessary, because of the fact, that no where in all the standard text books upon the subject of embryology, has a single reference been made to the development of the foetus or foetal membranes of the horse.

One may make a careful study of the works of Caldwell, Edwards, Eschricht, Hennig, Hertwig, Haaeke, Hoffman, Kolliker, Reichert, Lowe, Beigel, Ahlfeld, Kollman, Thomson, Bruess, Spee, Owen, Osborn, Fol, Turner, or Waldeyer and he finds no reference to any experimenting with the ovum of a mare.

The Hen's Egg and the Ovum of the Rabbit have furnished the material for most of the investigations upon

this subject. That there was a difference in the development of the foetuses of the different mammalia, has been noted by several embryologists. Both Owen and Kolliker have noted the difference in the outer embryonic membranes of the marsupials as compared with other mammals. The outer foetal membranes of marsupials retain a smooth surface, while most of the other mammals develop villi upon the chorion, which grow into the maternal mucous membrane.

The Foetal Membranes of Marsupials are never attached to the maternal membranes, while in most other mammals they are. In the case of the mare, they are sometimes attached and sometimes not. In no case are they ever attached as firmly as in the case of most other mammals.

Another Thing Peculiar to the Mare, is the quickness of development through the early stages of foetal growth, more rapid than that of any other mammal. In no other mammal can sex character be determined as early as the thirty-third day, when the gestation is any where near as long as that of the mare. The egg of the mare contains more yolk than most mammals, although the ovum is relatively smaller than in many others. And lastly, the place of the attachment of the foetal membranes is more uncertain, more irregular than in the case of any mammal.

The Theory of the Germ-layer development will not be discussed in this chapter. That the foetus is thus developed is well known to all embryologists, and a want of space makes it impossible to take up the subject in a manner that would prove satisfactory to

those unfamiliar with the theory. The development of the foetus will be illustrated after the manner adopted by Kolliker. The location of the foetus in the uterus will be illustrated from drawings made by myself.

Reference has already been made to the several ways in which the foetal membranes of mammals are developed. This will necessitate a brief classification of mammals into groups, to the end that the growth and development of the foetal membranes of the horse may be the better understood.

In the early stages of development the foetal membranes of mammals, present a striking similarity to those of reptiles and birds. One finds a yolk-sac, an amnion, a serous membrane or chorion, and an allantois. One finds that the embryo is united with the extra-embryonic area in the same manner, by means of a dermal and intestinal yolk-stalk. But in mammals as soon as the yolk is exhausted, some portion of the foetal membranes are converted into an organ of nutrition for the embryo, by entering into closer relation with the mucous membrane of the uterus. In some instances they are very simple, in others more complicated organs.

Because of These Differences in the manner of drawing sustenance from the maternal membranes, mammals are divided into three groups or classes.

The First is where the serosa (chorion) is retained in its primitive condition. To this group belong the marsupials, or mammals, such as the kangaroo. In these mammals the chorion retains its smooth surface and as it lies close to the mucous membranes of the

uterus, it can absorb nourishment from the latter and transmit it to the deeper lying embryonic parts, without being attached to it.

In the Second Group of mammals, intra-uterine nourishment is effected by the serosa being converted into a villous layer, or true chorion. In this group the mucous membranes of the uterus and the chorion generally unite.

A Special Organ, the placenta, has been developed in the third group for the purpose of intra uterine nutrition. This condition has been made possible by separate portions of the chorion having assumed different characters, owing to the unequal size and distributions of the villi. Some parts of the chorion may have no villi, and the chorion smooth, while in other parts may be found villi extremely long, the latter being very firmly attached to the membranes of the uterus. When many of these parts have arisen on one chorion they are called cotyledons. These are found in the ruminants.

Mammals That do not Develop Villi on the surface of the outer embryonic membrane are known as achoria, while those who develop villi are known as choriatà. Foetal and maternal parts of the placenta can thus become more firmly united with each other. The result is that at birth a larger or smaller tract of the mucous membrane of the uterus is also cast off, and is known as the decidua. This is less noticeable in the mare than any other mammal, while in the human subject the entire membrane is cast off.

Returning to the original subject, that of the de-

velopment of the foetus and foetal membranes of the horse. In figure 15, is shown a vesicle or foetus at the fifth day of development. The middle germ-layer is in full process of development, yet no folding process has as yet taken place. In figure 16, the middle germ-layer has spread out over and now encloses an easily distinguishable body cavity. The embryonic funda-

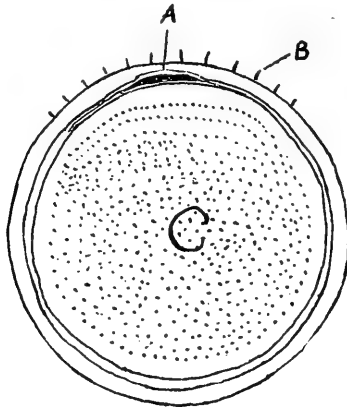


Figure 15. Development of the foetus. Fifth day after conception. A, fundament of the embryo; B, villi; C, yolk.

ment is in the act of being constricted off from the blastodermic vesicle. The head and tail of the embryo, by foldings of the separate layers, have been elevated from the area pellucida, and a cephalic and pelvic part of the intestinal tract, (the fore and hind gut) have arisen, with an anterior and posterior entrance, which open toward the cavity made by the folding of the vesicle.

At the same time occurs the development of the am-

nion, which is the inner sac, in which floats the embryo. In the figure above referred to, one can see that the anterior fold of the amnion has bent over the head, and the posterior fold, over the tail. The outer sac, which later must frequently be referred to, is the chorion. In some of the mammals these two sacs become one toward the end of gestation, but in the horse they do not.

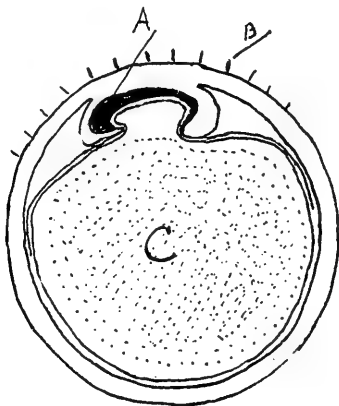


Figure 16. The development of the foetus; seventh day after conception: A, embryo; B, villi; C, yolk sac.

In figure 17, it will be noticed that the amniotic folds have not only greatly enlarged, but have grown toward each other until their edges meet over the back of the foetus. In the horse this meeting of the amniotic fold occurs at the ninth day, earlier than in any other mammal known. At this stage of development, or slightly earlier, one first recognizes the first trace of the allantois, which is the excretory sac, and most important

organ of respiration. It takes its origin from the posterior portion of the hind gut, at a time when the walls of this gut are still in process of formation. It enlarges rapidly into a vesicle, which grows out into the body cavity. At the same time the blind end enlarges, while the proximal part becomes narrow, forming into a hollow stalk, the urinary duct or urachus.

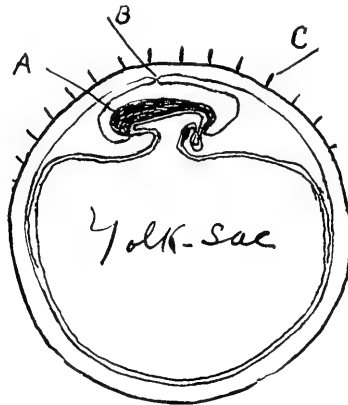


Figure 17. Development of the foetus; ninth day: A, foetus; B, meeting of amnion and serosa; C, villi.

In figure 18, can be seen a foetus of the mare at the eleventh day. At this stage of development the chorion (serosa) has become completely detached from the amnion. This also differs in different mammals. It is at this stage that the serosa permanently becomes the chorion. This has been brought about by the first appearance of villi upon the outer surface of the serosa. These villi are but small evaginations, or hair

like growths, upon the outer surface of the ovum. In all the figures illustrating this chapter the villi are shown at either pole of the ovum, but it is not until the eleventh day that they make their actual appearance. These villi grow into the membrane of the uterus, thus uniting the foetal and maternal membranes. Rarely does one ever find the branching form of villi in the foetal membranes of the horse, as in those

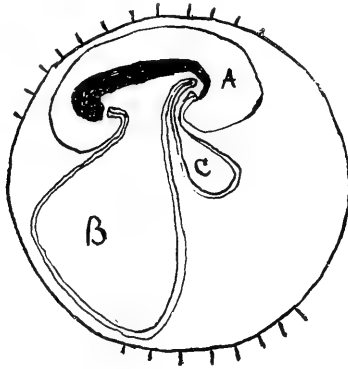


Figure 18. Development of the foetus; eleventh day: A, amniotic cavity; B, cavity of the yolk sac; C, allantois.

of other mammals, and rarely does one find villi upon the chorion in the case of the horse, except in a very small portion at one pole. As they are sometimes found at both poles, the illustrations were made to show them thus. In no mammal is there such a variance in respect of this as in the horse, for in some instances I have found no villi at the twenty-first day. In about seventy-five per cent of cases there will be no villi except at one pole. In the attachment or con-

nection of the foetal and maternal membranes, they occupy a smaller space, relatively, than of any other mammal. It is because of this, that there is never but a loose attachment, as compared with the membranes of other mammals.

In figure 19, is shown a foetus at the seventeenth day. It will be seen that the cavity of the allantois has diminished, and the yolk-sac has become the vitelline

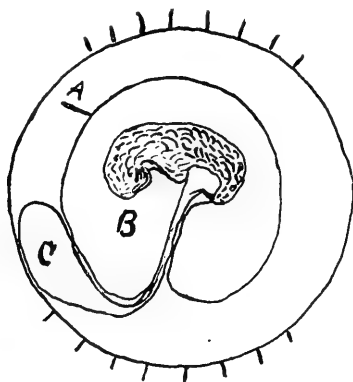


Figure 19. Development of the foetus; seventeenth day: A, amnion completed; B, amniotic cavity; C, allantois.

duct. At this stage the allantois becomes attached to the chorion, or rather suspended between the amnion and chorion. From this on no material changes take place, the principle change being one of growth.

In figure 20, one sees a foetus slightly older than the one in the preceding figure. The most noticeable change is in the beginning of an attachment to the membranes of the mare. In this and the succeeding

figure the foetus is shown attached to the fundus, or body of the uterus. This rarely occurs in the case of the horse and is only shown thus to show a change in development.

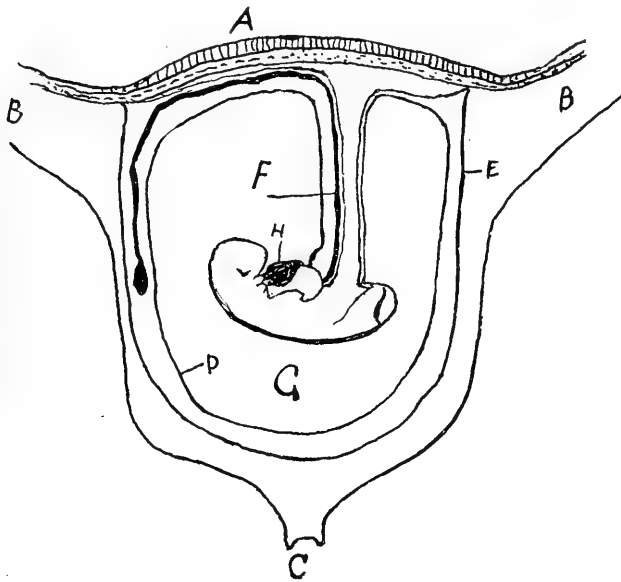


Figure 20. Development of the foetus; twenty-first day, showing position in the uterus: A, fundus of the uterus; B, horns of the uterus; C, cervix; D, amnion; E, first appearance of completed chorion; F, umbilicus (allantois); H, heart.

In figure 21, can be seen a foetus at the thirty-third day. Excepting size, and a few minor changes which will be mentioned later, one sees a foetus with all the outward appearances of a mature foetus. The sex can be determined and the outward form is practically

that of a mature foetus. The extremities are relatively a little shorter, as well as the head, but for all this the foetus could be recognized by any one as that of a horse.

In the growth of the hair, the first to be seen is that

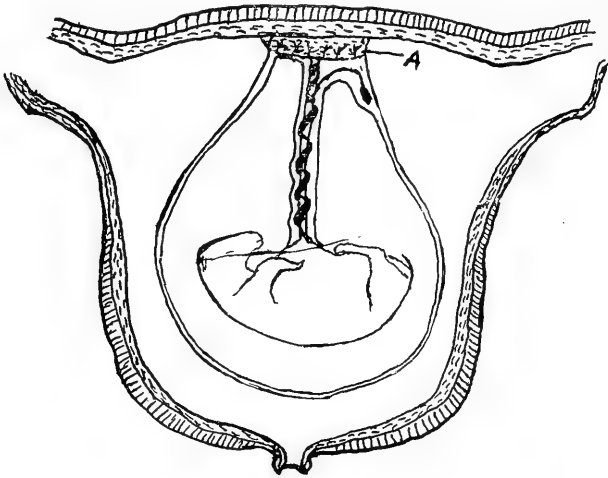


Figure 21. Development of the foetus; thirty-third day: A, attachment of foetal and maternal membranes. It will be noticed that as pregnancy advances, the uterus becomes relatively wider, the horns shorter and narrower, and the cervix shorter and firmer in structure. At this stage of development the umbilicus has become permanently attached to the membrane of the uterus.

of the future mane, which makes its appearance at about the sixth month. The covering of the body begins at the shoulders and neck, extending backward and downward, and from the feet upward, completing its covering around the navel. There is a difference

in mares of about a month as to the covering of the foetus with hair, but this will occur from the eighth to the ninth month.

As to the place of actual attachment, the horse furnishes an interesting study. In figure 22, can be seen a foetus attached to the membrane of a fallopian tube. This was found thirty days after semen had been in-

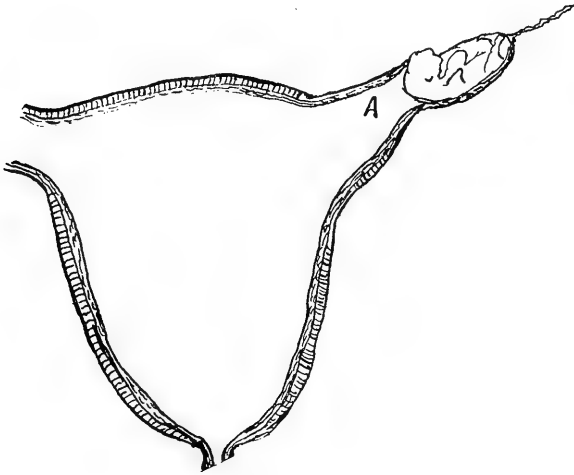


Figure 22. A foetus developing in the fallopian tube.

roduced into the uterus of the mare, and it is doubtful if it would ever have changed its position except as its own growth would have forced it backward into the horn of the uterus. I have several times found younger embryos in the same location.

In figure 23, can be seen a foetus in the extreme end of the horn of the uterus. This is the place where

most of them become attached, when attachment takes place. This will also account for nearly all mares carrying their foetuses upon one side, more than upon the other. Occasionally the ovum drops to the bottom of the uterus and well back toward the mouth, becoming attached in such a manner as to entirely close the uterus. In such cases the uterus cannot be dilated at the time of parturition, and the mare will need as-

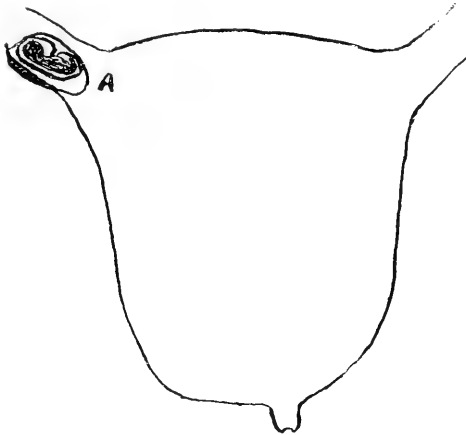


Figure 23. A shows foetus attached to membrane in the horn of the uterus. More foetuses are attached at this place than any other.

sistance in delivery. It sometimes requires much effort to open or dilate the uterus in such attachments, and there is some danger of flooding, following such deliveries.

The amnion at first lies close on the surface of the embryo, but later becomes extended by the accumula-

tion of fluid, the liquor amnii. This fluid at first contains about seven-tenths of one per cent of salt, together with albumen and other substances. It continuously increases in its salt solution, until at the end of gestation it sometimes contains as much as three per cent. In most mammals, and especially in man, the volume of amnion fluid is greatest at about two-

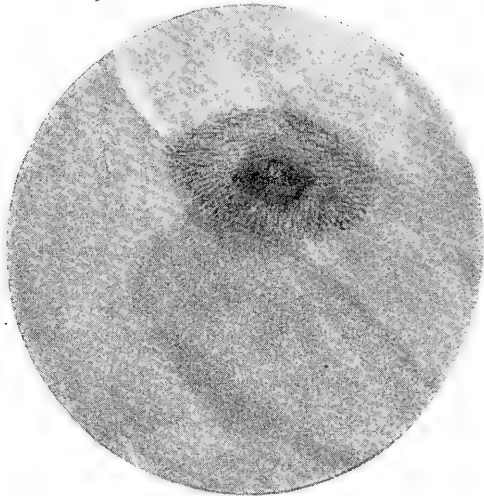


Figure 24. An ovary of the mare showing tube to the germ cell.

thirds of the period of gestation, when it decreases until the time of birth. In the horse it continuously increases up to the time of parturition.

Only one more matter is worthy of mention in this chapter, that of the full development of sex. Both the ovaries and testicles begin their development at a very

early period in the horse, probably earlier than in any other mammal. The testicles of the male begin to descend at about the ninth month, reaching the scrotum from a few days, to three weeks before birth. The difference in time in this matter is more the result of inheritance, than any other cause. The get of some stallions are always born with the testicles in the scrotum, while the get of other stallions are born with the testicles above the inguinal ring.

Tubes or openings into the ova of several forms of life have been observed by a few embryologists, and it was always in genera whose ova were covered with a thick membrane (*zona pellacida*). The ovum of the mare is thus covered, and we find it has a tube through which the spermatozoon enters, as shown in figure 24. I made this discovery while experimenting in artificial conceptions, when I observed that all spermatozoa would collect at one point on the ovum. A microscope of high power, explained why they did this. Figure 12 shows spermatozoa thus collected.

CHAPTER III.

THE SELECTION OF A STALLION.

Masculinity. It is impossible to produce the highest class of horses in any breed without the aid of high class mares. Yet the average quality of the horses in the country can only be advanced by use of quality stallions. What a stallion will do for the community in which he is owned, will depend more upon his head and temperament than all else. No horse has ever proved himself a great sire, if not a stallion of most pronounced masculinity. This will be determined by the crest, the massive jaw, the voice, the hard and fixed expression of the eye, the muscular development of the jaw, neck and shoulder, and by his action and every movement. Life must be begun in power. To be complete, it must be begotten with that immense energy, sufficient to impart the greatest possible momentum to all its functions. To achieve all this, requires potential virility. The stallion must start off all the bodily organs and functions of the future foal. This potential force must be powerful in the stallion, that the organism may be vigorous in his foals. A stallion with small or weakly masculinity will sire many foals of low vitality, even though mated with strong vigorous mares. The mares may supply plenty of organic material for

the nourishment of the foetus, but it may have too little life force to appropriate it. An enfeebled mare may produce a strong vigorous foal, if sired by a stallion of strong masculinity. In this case, the mare will still further enfeeble herself to nourish the foetus. The more a stallion is such mentally, the more he will be one physically and sexually. The male body is created by the male mentality. When speaking of the mind or mentality of the horse, I wish to be understood as including the entire nervous organization of the horse.

Nature's Laws of Sex Attraction. Nature does nothing without a well defined purpose. The stallion's peculiar voice is given him, that it might attract mares to him. Any mare will readily recognize the voice of a stallion from that of any other horse, as far as she can hear it. The same is true of the odor peculiar to the sexes. The massive jaw and extra muscles of neck and shoulder are given the stallion as weapons of both offense and defense to aid him in fighting battles necessary for the defense of his herd. The hard and fixed expression of the eye is but the outward expression of being so full of masculine power that it must find expression in every look, in every action, in his entire being. He is the most perfect stallion, who is the best equipped, best adapted to fulfill the office for which he was created. All masculine endowments must be stamped upon the offspring at the time of conception; while female influences are continued through a period of eleven months. Therefore, for the time being, the powers of the stallion should be far the greatest, since each endows about equally.

Masculinity a Breed Characteristic. Masculinity is much more pronounced in some breeds than in others. Among the draft breeds, the Belgian stallion is most masculine of them all. The Shire stallion is usually found possessing masculinity in a low degree. His small jaw and feminine neck give him the outward appearance of a gelding. Many stallions of this breed are wanting in masculinity to a marked degree. It is a well-known fact among intelligent breeders that the Shire stallion is a source of more trouble as a breeder than the stallions of any other breed. Some individuals of this great breed are as virile as any I have ever known, yet the fact remains that many among them are inclined to be "shy." I have been keeping records and compiling statistics obtained from others, for many years, and state with much confidence that one can detect the "shy" breeders from any herd of stallions.

Stallions That Are Unprofitable. For the purpose of this chapter, I shall assume the reader does not own a stallion at this time, but has decided to purchase one. Let me inform you before you make your purchase that of all the stallions sold in this country, not more than one of every ten, has ever paid as a commercial proposition. After the expense of his keep and handling has been paid, I doubt very much if one of every ten has earned enough in collections to pay for his first cost. There are two primary causes for this being true. First, the stallion was sold for more than he was worth. Few stallions have ever been sold in this country at their true value. Any other than a high class, well

bred and strictly sound stallion has no value whatever. The number of scrubs, undersized and unsound pure bred stallions that have been peddled and sold in this country is appalling. There is no one to blame for this condition of affairs, but the buyer himself. Just so long as such hot air advertising as "Ten acre barns, full to the roof of all ton horses," is more attractive to the buyer than the plain honest statement of a reputable breeder or dealer, just so long will the buyer be complaining of buying a gold brick. Just so long as the buyer goes out to buy something cheap, just so long will he pay something for nothing.

Secondly, another reason why so few stallions pay is because of poor handling. Scarcely one man in twenty now handling stallions is capable of doing so intelligently. It is really surprising how many unintelligent, superstitious, double-cover, look-over-the-left-shoulder, dark-of-the-moon, first-heat-filly-foal men there are in the country handling stallions. I have known men who have handled stallions for more than twenty years, to state that it required all the semen of one discharge to impregnate a mare. I believe there are more misfits in the stallion and jack business, than any other business in the world.

The Purchase of a Stallion. If you are ready to purchase a stallion, no place you can go is likely to prove so profitable to you, as to some reputable breeder, where not only the sire, but dam, and frequently the second and third dams can be seen. If the stallion is a good one and of a desirable type, and you find his sire and dam of a type equally good, you know to a rea-

sonable certainty what his offspring will be. If it be impossible to buy of a breeder, then buy of a reputable dealer. Be fully decided as to what you want before you leave your home, and do not buy until you have found such a horse. You will find it well to do the buying yourself, rather than let the seller do it for you. If the horse shown you is of the breed and type you desire, look him over carefully as to his soundness. First see if his age, color and marks correspond with his certificate. If they do not, pay no attention to excuses or explanations, but leave him alone. Be mighty careful about his eyes. Defective vision is transmitted with great certainty. Be sure there is no blueness about them. A good, clear, prominent and expressive eye is essential to a good breeder. A hazel eye is always a good one. If he is three years or more of age, note whether or not he has that hard or fixed expression already mentioned under masculinity. He should also have a well developed or masculine jaw, the same wide apart underneath, with a clean, neat throat. Full meaty throats are likely to become thick in the wind. His ears should be carried erect. His crest should be well developed with neck of fairly good length. Few draft horses have ever had too long a neck. His neck should be well set upon nicely sloping shoulders. You are supposed to be buying a sire, for producing high-priced commercial horses. High-priced geldings are never seen with short necks nor straight shoulders. Viewed from in front, he should be wide, carrying his width all the way back, and well muscled upon shoulder, arm and forearm. His legs should be set well under him, and only medium in length. If his

legs are set too wide apart, he is sure to roll when in motion, causing more resistance, thereby resulting in added friction to all his movements. The knee should be wide, carrying its width well down below. Such knees are rarely seen with splints below them. If you are after a true drafter, he should measure not less than ten inches below the knee, nor less than twelve below the hock. If he measures twelve inches below the knee and fourteen inches below the hock, so much the better. Viewed from the side, all legs should stand perpendicular to the body. The pastern should stand at an angle of 45 degrees. The utility of the pastern is to dissipate concussion. A straight pastern and a straight shoulder are generally found together. Such a conformation is the cause of most sidebones, ring-bones, navicular troubles and shoulder lameness. Too much importance can not be attached to a correct pastern. If too straight in a young horse, it will only become more so with age, resulting in knuckling. Good feet are a valuable asset to any horse. This is more especially true of the forefeet, as about sixty per cent of the weight of a horse is borne upon his forefeet. A wide hoofhead is very important, together with wide heels. Wide heels are usually associated with large, elastic frogs, to act as a cushion in dissipating concussion, which the pastern continues.

Going back to the body, the length of back from shoulder blade (scapula) to point of hip, should never exceed in length, the length of that part of the quarter measured from the point of hip to point of buttock. If depth of shoulder and length of quarter each exceed the length of back, we have a near approach to the

principle of the arch, the strongest self supporting figure known to the science of mechanics. A long back is quite a common defect in many draft horses. The body should be round, with ribs well sprung and extending well downward. This will give you a horse of good lung capacity as well as a good feeder and doer. The horse cut up in the flank is a poor feeder, always, recovering slowly from extra exertion in the way of hard work or long shipping. The loin should be wide and well muscled. The croup should be long, straight and well muscled. There is a wide difference in the draft breeds as regards the croup. Some of the breeds as a whole are very straight in the croup, while others appear very steep in the hind quarter. A long straight croup adds much to the appearance of the horse. So far as strength is concerned, it matters not so much about the angle, as does the extent to which the croup is covered with muscle. The thigh and quarter should be heavy, this region of the horse being composed principally of muscles. A draft horse should be heavily muscled throughout the hind quarters, for it is the hind quarters that furnish most of the power in drawing heavy loads. The hocks should be given more attention than any other part of the horse. More draft horses go wrong because of defective hocks than all other defects combined. No hock can be too good or too strong. Viewed from both in front and at the side, the hock should appear broad, yet clean cut and free from fullness. In front of the hock and slightly to the inside, look closely for a spavin. Never buy a stallion with a spavin, even though a small sum will buy him, unless you wish to start a breed of spavined

horses. I know of one stallion in South Dakota having a spavin upon his right hock, and seventeen of his foals, the get of a single year, developed spavins upon the same leg before they reached their first year. The hock should be kept sharp in all its features and angles, as such a hock shows more quality, both in bone and the tendons attached to it.

Quality. The hair upon the legs should always be fine, and as short as the breed character will permit. Nothing indicates quality in a horse so much as the fineness of the hair. Fine, soft hair is associated with fine, soft skin, and all such animals will be found possessing bone and tendons of a high quality. In addition to this, a horse possessing quality in a high degree will not only have more strength, but much greater endurance as well.

The Generative Organs. Examine the generative organs of the stallion you are about to purchase. The testicles should be well developed, and even in size. Stallions with one small testicle, sire many ridgling foals. The smaller, or rather shorter, the penis, the surer he will prove as a foal getter. This is because of his being able to make more complete services, by depositing the semen in the uterus. If you notice bunches of tallow deposited about the sheath, let the other fellow have him. Even with the tallow bunched upon and around the generative organs, he may still be able to produce foals all right, but as a producer of high-class foals, his vitality has been impaired forever. Tallow deposited in any part of the animal, necessarily impairs the vitality of all nerves and glands in that locality. It will take two years of careful and intelli-

gent handling to put such a stallion in good breeding condition. Can you afford to do this?

The Action of the Stallion. Now have the stallion put to the walk. This is the only gait of the draft horse. Give the strictest attention to his every movement, viewed from in front, behind and at the side. In approaching you, the feet should be lifted clear of the ground, then placed down evenly and in line. From behind, the legs should be kept well under him, the flexion of the hock even and in line, the bottom of the feet showing at every step. From the side, the stride should appear balanced, quick and elastic. In addition to all this, in the well-sexed stallion, there should be an indescribable something to his motion and action, as though every nerve and muscle, and tendon were made of the highest and best tempered steel, ready to spring at the slightest volition. If he moves about as though partially unconscious of his surroundings and mission in life, I would not care to own him. The tendency of all stallion salesmen is to show their horse at the trot, rarely at the walk. The trot is of little value to the draft horse, other than to show soreness or lameness. If he walks right, his trot will be all right.

Good Wind Very Important. Not less important than any of the points mentioned, is to know the stallion you are buying has good wind. Test him thoroughly in this respect, for without good lungs, and good wind, a stallion has no value. Few stallions in the past have ever been tested by the buyer for defective wind, resulting in many a disappointment because of this negligence. I know of a stallion in South Da-

kota, sold by an Eastern firm on the company plan, for \$4,500. This horse if gelded at that time, would have sold for \$100 and no more. Unfortunately for that community, he proved a sure foal getter, and has filled that country full of horses with defective wind. The damage to the farmers of that county can not be measured in dollars, for it will take fifty years of judicious breeding, to correct the injury done them, besides the first commercial loss of thousands of dollars. No defect, no disease of the horse is more likely to be transmitted than laryngeal hemiplegia. Beware of the wind-broken stallion. Put him to a severe test, and if the slightest roaring or whistling can be detected, pass him up.

Testing the Stallion's Virility. If the stallion has proved all right thus far, and you have been made a price which you believe to be reasonable, buy him, with the understanding that he is yet to be submitted to one more test; that of a breeder. Have this question settled before you pay a dollar upon him. There is but one way to settle this point, let the microscope do the work. Have him mated with a mare, and test the semen yourself. A microscope with a magnification of 400 or 500 diameters can be had for \$30 and it will be worth several times that amount every year, if you continue in the business. No man can intelligently handle a stallion or jack without one in these modern times. We are now living in the twentieth century, a time famous for its high intelligence, its many inventions, and its many master minds in every field of human endeavor. Competition in every line of commercial activity is mighty keen. If you do not intend

to handle your stallion in the most intelligent manner known to this age, you will do well not to buy one, for your competitor will most likely, handle his horse in a business like way.

Guarantee. No guarantee of breeding is worth the price of the paper upon which it is written. There are plenty of breeders and dealers who are honest, and who will make good, but when you have handled and cared for a stallion one or two years, with no returns, who is going to pay you for your actual loss, in expense money and time? Even though you do get another stallion in exchange for the one already shown to possess no breeding value, your loss is too great to take any chances on. Besides this second horse may prove no better than the first if taken without being tested. There is but one business way to avoid this loss and annoyance; test the horse before you buy him. Twenty years from now, no stallion will be sold in this country in any other manner. If the stallion is a breeder, the semen will disclose the fact, in the number and vitality of the spermatozoa, as shown in figure 2. If the spermatozoa appear few in number, or if they show but little mobility, let the horse alone. This test can be made in the coldest weather, by the use of water at a temperature of 101 degrees, and doing the work in a warm office or other warm room.

Size and Weight. If you are breeding draft horses, no stallion you can buy will ever prove too large, provided he possesses quality with scale. I have many times mated small Indian pony mares, weighing from 550 to 800 pounds to ton stallions with uniformly good results, while if your stallion is coarse and unbalanced,

his foals will be the same, even though mated with large mares. Taken as a whole, our draft breeds are all too small. The demand for heavy geldings of quality, such as sell for \$300 to \$500 each, is many times greater than the supply, and always will be. The amount of small blood, even in our largest stallions and mares, the law of reversion working with this fact will always give us a preponderance of undersized horses, even when we use the largest sires obtainable. In speaking of draft horses, there is a wide difference between size and weight. The two terms have a distinctly different meaning. It is no easy matter to tell a new beginner, how to distinguish between them, for added fat, also increases most measurements of the body. As already noted, it is a safe rule to refuse to buy any stallion carrying fat to the extent of showing it in bunches. Most shrewd dealers have carried the feeding end of their business to a dangerous extreme. It is surprising to one who does not know, to learn the amount of weight that can be added to a draft stallion in ten or twelve months of good feeding. Fat covers a multitude of defects. Many a man has bought a ton horse, only to find when he has been put in good breeding condition, that his weight does not exceed 1,600 or 1,700 pounds. I know of one man buying a four year old stallion at a weight of 2,020 pounds, which has never passed 1,600 pounds since he was six years of age. This horse today is without any patronage because of his smallness. He was sold by a dealer who advertises a barn full of all ton horses. In determining the actual size of a stallion, I have already called attention to the measurement of the leg. The

fore leg should measure never less than ten inches around the cannon in the smallest part, and never less than twelve inches behind. In body measurement, his height should be from $16\frac{1}{2}$ to 17 hands, to give best results. In girth measurement, one must take into consideration the amount of flesh he carries. Every hundred pounds of flesh added to a stallion weighing 1,800 pounds will increase his heart girth more than an inch. In this measurement he should never be less than 88 inches in good breeding condition, and 90 inches or more in flank girth. No stallion intended for the siring of high-class geldings can be too long in the body, so long as he has a short back. The short back in long bodied horses is made possible by the sloping shoulder and long quarters. This conformation gives us the horse with the long, easy stride. Such a stallion as described in good breeding condition as to flesh will give us a weight of better than a ton. This makes a good drafter. So good in fact, that it takes much time to find one, and such a one, if right in all ways, is worth all he will ever cost you. Such a stallion, if a producer, will make his owner money in any part of the grain belt of this great country of ours. Such a horse, if a breeder, has never failed to make good. Competition from the viewpoint of today, is unknown to him. A good type of draft stallion is shown in figure 25.

Disposition. One should avoid bad dispositions in buying a stallion. Should one become dangerous or even difficult to handle, be sure and take no chances. No stallion ever lived that cannot be handled safely. It will not do to show fear, yet one can so handle a

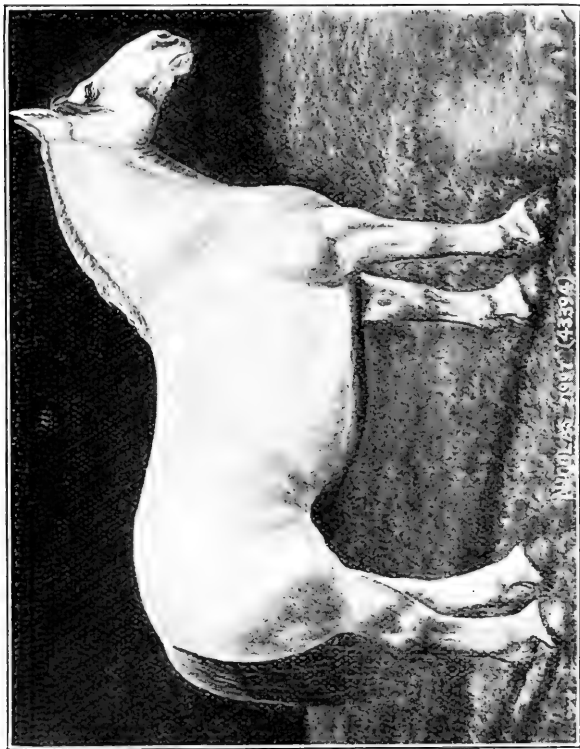


Figure 25. The imported Percheron stallion, Nicolas 21997 (43394). This stallion has sired more live foals than any stallion that ever lived, exceeding 200 every year. A grand type of a draft stallion, in masculinity being excelled by none. This is a reproduction of a photo taken in his fourteenth year. Note the extreme length of body, yet the very short back, made possible by the sloping shoulder and long quarters. The extreme width of hock, the angle of the pastern, and the muscular development are seldom found in the same horse. This stallion has been in harness the better part of his life, yet is as sound as when foaled.

horse, that no injury can be done, either to groom or stallion. Nothing is better for reducing the temper of a vicious stallion than hard physical labor in large doses. Many fairly intelligent and naturally good dispositioned stallions are made bad, because of their excessive masculinity, coupled with bad handling. The foals of such will have good tempers, while inherited viciousness will again be transmitted. For controlling a bad tempered stallion, when being used with a bridle only, use a rod eight inches long, with a small ring in one end, and a link in the other. Weld the link in the right bridle ring, pass the other end under the jaw and through the left bridle ring. By buckling the lead strap into the end ring of the rod, one can easily break a stallion's jaw. Such a rig is only severe, as the stallion makes it so. It is well to have but one groom handle a bad tempered stallion. Many a fairly good temper has been made to go wrong by too many men handling the stallion.

Summary. To put this entire chapter in one paragraph, a stallion should be endowed with great masculine power, as expressed in the voice, the expression of the eye, the erect and alert carriage of the ear, the well defined crest, the massive jaw, the great muscular development about the neck and shoulder and his action, which should be as if he was overflowing with sexual power and vigor. The body should be long, but short on the back with sloping shoulder and long, fairly straight croup and quarters. The underline should be long and well let down at the flank. Loin wide and well muscled. Ribs well sprung with great depth of body. Legs well set under him, with an

elastic, sloping pastern. Hock wide, especially just below and at the joint, clean and well defined in all its points and angles. His feet should be good, with wide hoof-heads, wide and high at the heel with wide thick frog. His walk should be free, easy, in line, elastic, in short the equal of a perfect machine, made for that express purpose. This coupled with soundness in every part, with the lungs and wind of a locomotive, temperament and intelligence of the best, will give you a stallion you do not need to lead down the back alleys, when you take him to your home town.

Grades and Unsound Stallions. One more thought and this chapter will be ended. You may now own a grade stallion, or you may own one with a pedigree extending back into the very remote past, but for all that one that is unsound, and of inferior quality. If you do, use him to the best of your ability. This is a privilege not yet denied you in many of our states. Get your money out of him as soon as you can, for in a very few years, no stallions will be permitted to stand for service anywhere in this country, unless he be a pure bred, and free from all hereditary defects. Because of this, be careful as to the quality of the next stallion you buy. Go where we may, the same echo is heard rolling across the country: only sound and pure bred stallions shall be used. It is in the very air we breathe, it is heard upon nearly every farm, and because of so many inferior and unsound horses reaching the markets, we now hear it in the auction ring. The American farmers can always be depended upon to come out right upon any question of vital importance

to their own interests and their country's welfare. They are now practically a unit in demanding such stallions.

CHAPTER IV.

HANDLING THE STALLION.

Care of the Stallion. The stallion is, generally speaking, the most abused of all our domestic animals. This abuse is not always intentional, sometimes being the result of intended kindness. It is none the less an abuse, however, when we shut a stallion up in close quarters for the greater part of the year. Another abuse which is intended as a kindness, is overfeeding, especially when such feed as corn is used in large quantities. Many stallions have been made more or less sterile because of such feeding. The following table is the result of the feeding systems of draft stallions owned in five states:

No. of Stallions	Kind of Grain	No. of Mares Bred	No. of Foals	Per cent of Foals
102	Corn	23173	9073	39
194	Corn and oats	29207	13435	46
149	Oats	24781	14381	54
71	Oats and bran	9319	5777	62
31	Grass and alfalfa	4658	3773	81

Some of the above stallions had stood several years in the same place, and the mares listed includes mares for all those years. By this table, we learn that oats and bran produced 62 per cent of foals, while corn produced only 39 per cent, but little more than half. Even corn and oats produced seven per cent more foals than corn

alone. In the case of grass and alfalfa, with no grain at any season of the year, we get 81 per cent of foals. These stallions ran in pastures for about four months each year, when they would be taken up and fed alfalfa for the balance of the year. It can not be said that these stallions were mated with better mares than the other stallions, as all except a few young fillies which remained in the pastures were mares that worked every day. The mares brought in for service were taken to a corral in the pasture to be bred, so that all mares were served in the pasture. Every stallion in this table was registered, 309 of the 547 were imported. Of the thirty-one fed grass and alfalfa, only twenty-three were imported.

If one wants other evidence that our system of feeding is wrong, if it is foals we are after, we only have to compare the foal crop of the several states to again learn something as to feeds. This table is not intended to show the kind of grain fed to the stallions, but it does show the per cent of foals in states where corn is the principal grain, as compared with those where corn is not fed. These statistics were gathered by sending blank forms to be filled and returned by stallion owners. It is not claimed that they are in all cases reliable, but without doubt, they are as reliable as the average of any statistics. It took twelve years to collect them. The following is the result:

State	No. of Mares Bred	Per cent of Foals
Colorado	6359	67
Idaho	6417	73
Illinois	11983	46
Indiana	1734	47
Iowa	14891	47

State	No. of Mares Bred	Per cent of Foals
Kansas	6039	44
Michigan	1468	58
Minnesota	7457	61
Missouri	6796	41
Montana	8138	72
Nebraska	23823	49
North Dakota	3162	56
Oregon	4971	71
South Dakota	10382	52
Washington	4613	71
Wyoming	3667	72
Wisconsin	3598	60
Ontario, Canada	13294	71

In this table, we learn that in the six corn states: Illinois, Indiana, Iowa, Kansas, Missouri and Nebraska, no state can show fifty per cent of foals. Of these states, Nebraska is the highest with forty-nine per cent, while Missouri is the lowest with only forty-one per cent. South Dakota has seven counties classed as corn counties, the balance of the state growing more of the small grains, and we have fifty-two per cent of foals for the entire state. Michigan, Minnesota, North Dakota, Wisconsin and Ontario can be regarded as oat states, oats being the principal grain feed in all these states. In this group, we have from fifty-six per cent in North Dakota to seventy-one per cent in Ontario. This gain of the oat states over the corn states is much more than at first appears, when studied in the light of profit or loss to the stallioner. Colorado, Idaho, Montana, Oregon, Washington and Wyoming can be classed as grazing states, and we have here in this group from sixty-seven per cent for Colorado to seventy-three per cent in Idaho, another very profitable gain.

In the light of these statistics, the nearer we get to a corn ration, the lighter the foal crop; while the nearer we can get to a grass ration, the larger the foal crop. I made an effort to obtain statistics upon this matter from other states, but not enough replies were made to justify their publication.

Our system of feeding draft stallions, owned and kept for breeding purposes, is bad. We feed too much, rather than too little, and not very often a balanced ration. For best results in breeding, it is better to have too much rather than too little protein, but we must not feed too much. If our draft stallions were required to work every day in the year, it would be quite different, but very few perform any physical labor of any kind. This is not only bad from the breeding point of view, but it is the source of so much trouble in the way of sore legs in its many forms.

The feed for a stallion should be of the best quality. Badly cured or musty hay should always be avoided. Clover and alfalfa if properly cured have no equal, but never in larger amounts than one pound for each one hundred pounds of horse per day. Clover and timothy mixed is the next best hay. There is no hay so difficult of digestion for the horse as timothy. This is even more so when cut too ripe. It is also low in nutritive value, no better than good wild hay. Good hay is everything in feeding a stallion. I kept an imported stallion upon an exclusive diet of alfalfa hay for six years. During the season and summer following, he worked in the fields five hours every day. In the winter he was used to assist in feeding the stock, which required him to be in the harness every day. During the six years he served 512

mares, 414 live foals resulting. The foals all showed remarkable vitality, and the stallion kept in the best of breeding condition. This was done for the sake of the experiment. Other stallions kept at the same time, and under the same conditions, except grain being fed them, did not do as well nor leave so many foals.

No one grain, fed alone, will give as good results as oats. The next best grain I have ever tried is barley, but it must be crushed. Unless alfalfa or clover is fed for hay, a little bran will improve either grain. I would make corn no part of any stallion's ration. This is not because of what is disclosed by an analysis of corn, but because it is absolutely indigestible for any horse. The excrement of all horses fed corn are too acid, that is sour. There is always too much fermentation going on where corn is fed a horse. When swine are unable to either digest or assimilate corn, how can we expect the horse with his delicate digestive organs to do so? If we take two pens of swine of equal numbers, and feed pen number one all the corn they will consume, and feed pen number two only the excrement from pen number one, the swine in pen number two will make the greater gain. This does not make a very good showing for corn as a grain ration for a horse. When either oats or barley have been used, I never feed a stallion during the breeding season more than three-fourths of a pound to the one hundred pounds of weight per day. Salt should be accessible to the stallion at all times. Both feed and water should be given at regular hours, but never feed a stallion grain nor give him water within three hours of the time he will be required to make a service.

Standing for Service. No part of the stallion business shows such a want of business methods and ethics, as that of standing him for service. This is in part due to the owner of the stallion having no business system, and occasionally no business principle. The man who makes two prices for the same commodity is a dishonest man. Many men have failed in business because of this weakness. No man will ever succeed in the business who has two prices. It is with no feeling of egotism that I make mention of it, but I believe no man living has ever bred more mares with stallions owned and controlled by himself than I have, and if I was asked what had contributed most toward my success, I would say it was because I have never made two prices for the same horse; that I always tried to own horses just a little better than the other fellow, and lastly, I have left nothing undone to make my patrons money. If you cut your fee for one man, even he will always believe you are doing it for others, besides being suspicious that you made a lower fee to the other fellow than you did to him. Have one price and try and make all pay it.

Much has been said and written against the "live foal" and "stand and suck" contracts. I have been making a study of the farmer and breeder during the past thirty years, as well as the horse. I can show that either my system of bookkeeping is wrong or that such a contract is profitable. In giving patrons a choice of two contracts, \$15.00 to insure a mare in foal, payable December 1st, or \$20.00 for a live foal, only about one in every 100 men have taken the "to insure" contract. Now \$20.00 is 33 1-3 per cent more than \$15.00, and for thirty years I have lost only six per cent of mares known

to be in foal. To insure a live foal may not be as profitable as some other forms of insurance, but it is profitable. Few stallion owners keep their books in either a business or statistical form. All books in this business should be kept in statistical form to the end that one may know all about his business, and especially the kind of mares that are both making and losing him money.

The Best Service Contract. No service contract known is so good for all parties concerned, as the "cash in advance" contract, with privilege of return for the balance of the season. This is best for two reasons. First, it gives the stallion owner a better chance with his horse, because of practically barring all mares known by their owners to be shy breeders, besides giving the stallioner the use of his money at the time he should have it. He can afford to make a very low fee with such a contract. If he knows how many mares he can command, he can know to a certainty what his income will be. Secondly, nothing causes the average mare owner to take a greater interest in the business or to give his mares so good care as to have his foal paid for. Wherever it has been tried in the northern states, it has proved both popular and successful.

Conditioning the Stallion. One has no right to ask patronage of the public, unless he is in a position to give good value for the money received. To give good value for service money received, not only requires a good stallion, but that stallion must be in good condition. To start off the embryo life and future foal with the life force and vitality, which it will need to carry it through to a vigorous old age, makes it of vital importance that the stallion be in the best possible

physical and sexual condition. The stallion that has been confined in a small stall or yard for eight or nine months will be in mighty poor condition to sire such a foal. If the conditions are such that work is impossible, one should begin fitting his stallion as early in the spring as he can for the great work confronting the stallion. At least a month before the breeding season is expected to begin, the stallion should be given regular daily exercise. If he has done nothing but stand around all winter, he should be given but little exercise at first, but increasing the amount every day until the maximum is reached. He should be given service, even if it has to be given free to some one, at first one service per week, then increase the number of services by one mare each week until one service per day is reached. The complaint is general all over the country that mares do not settle well early in the season. It is not the mares, but the stallion usually at fault. In tests made of many stallions with the microscope, only a small per cent are found in good breeding condition in the early spring. Even one month would work great changes in a stallion, if the month was spent in exercise with an occasional service.

One Service a Day. In the handling of stallions for service, no one thing has been the cause of more failures or more instrumental in causing a low per cent of foals, than the practice of making two or three services per day. Very careful and extended experiments with draft stallions, by the use of the microscope at every service have demonstrated the fact that from 10 to 13 hours are required for a stallion to secrete semen containing spermatozoa, providing the stal-

lion is given regular daily service. Less time is required by warm bred, than by draft stallions.

Many years ago, I was handling an imported Percheron stallion. The foals resulting from his first year's service were so good, I was forced to make two and three services daily during his second season. Well along into the season, I observed he would sometimes enfoal a shy breeder, but fail to settle a regular breeder bred the same day. I blamed the horse rather than the mare. This led to my microscopical examination of the semen at every service. I carried this work on for three seasons, using different stallions every season. As the results were practically the same with all stallions tested, I will give a complete record of one during a season of eighty-four days. This stallion began the season with one service daily, which was continued for twenty-one days, working in double harness in the field five hours each day throughout the entire season. The second twenty-one days, he made three services daily, no two occurring nearer than five hours apart. From the sixty-three services made during this period of twenty-one days spermatozoa were present in only thirty-nine of them. The next twenty-one days, he made two services daily, no two occurring nearer than eight hours apart. In the forty-two services of this twenty-one day period, spermatozoa were present in only thirty-one of them. During the last twenty-one day period, he made only one service daily, and spermatozoa were present in all of them. Here it will be observed that at the end of a strenuous season of eighty-four days, with only one service per day, every service gave results, while during the first half

of the season, with three services per day only a little more than half of them gave results. During the twenty-one day period when the stallion was making three services per day, I was just as likely to find the third service a good one as the first or second. I had a large number of mares of my own, so that by occasionally serving the same mare twice, I had no difficulty in making all services in the required time.

The Stallion in a State of Nature. In handling a stallion, the best results will be had by following the natural instincts of the horse, so far as domestication will permit. In the aggregate, I have spent several months both day and night, upon the range with a stallion and his mares, for the purpose of studying the breeding habits of both stallions and mares. Much information of value to breeding I have gathered in that manner. It was thus I learned a mare is never served by the stallion until she is well advanced in her heat period, not until she is in perfect breeding condition. The stallion will make frequent visits to the mare, in some cases for three or four days before mating with her, and she in readiness for him all the time. In one instance, I recorded twenty-six such visits before the stallion mated with the mare. Nor does the stallion abuse himself, as most men suppose, when running with mares upon the range. I have a record of one instance where a watch was kept for nine days and nights, with mares in readiness at all times, and yet the stallion made but eight services in the nine days.

Another fact worth remembering is that 90 per cent of all services made under natural conditions are made between sunset and dark, usually just at twilight.

My own statistics of farm mares bred, show this to be the most favorable time for settling them. This time of breeding with reference to farm mares is favorable because of giving the mare an opportunity to rest after the service.

When making services too often with a stallion, he is likely to acquire the habit of failing to exhaust, a practice which soon gives you a stallion possessing no value as a breeder. Even with natural service, a stallion will leave more and better foals with only one service per day, than when making two or more. The most accurate statistics we have upon the subject disclose the fact that only forty per cent of all mares bred in the United States produce foals, and that it requires three and one-half services of a stallion for every foal produced. The stallion that can not settle more than forty per cent of his mares with only one service, provided he has good handling, is not a sure breeder. Since we know the majority of stallions are sure, there must be some very poor handling.

The Vices of Stallions. Many stallions acquire vices by idleness, others by poor handling. Among these vices may be named cribbing, wind sucking, lip lapping and masturbating, which are all stable vices, generally the result of idleness. For all of them I would prescribe work, and before they are too well fixed to be broken. There are several vices showing themselves only at time of service, such as being too impetuous with a desire to run at a mare in a manner endangering the safety of the mare and all those in her immediate vicinity. There is nothing better for this than the rod through the bit rings and under the jaw, reference to

which has already been made. Then we have the vicious stallion. This is always the result, either of an inherited tendency, which can again be transmitted, or an excess of masculinity, coupled with poor handling. Little is to be gained by handling any stallion roughly. Even a vicious stallion can be handled without danger to any one, by so handling him at all times that he has no opportunity to do any harm. Firmness with intelligence will do more than beating or clubbing a stallion.

The Use of Young Stallions. To make a good server of a stallion, one should begin with his first mare. It is easy to make a good server of any stallion if you can begin with him when a colt. A stallion should be taught early in his career to walk up to the left side of the mare, place his shoulder against her flank so as to avoid kicks, and mount her only when commanded to do so. A little patience and intelligence upon the part of the groom, will soon result in teaching a colt so that he can be used in service without a strap upon him. In many respects it would be better if a colt could reach three years of age before making his first service. While nothing in the service itself can injure a colt, yet too early service is likely to lead to the vice of masturbation. If a colt is to be used in his two year form, never mate him with more than eight or ten mares that year, and give him one mare every five days until he has served them all. Never use a young colt for teasing, and do not permit him to stand where he can see such work being done. If he can be used at light work at this time, by all means work him. In making the first service with a colt, use a quiet

steady mare, and have a strong man upon either side of her. As soon as the colt has mounted and succeeded in beginning his work properly, have the men at each side of the mare take him by the fore legs and hold him well forward until he has made a com-

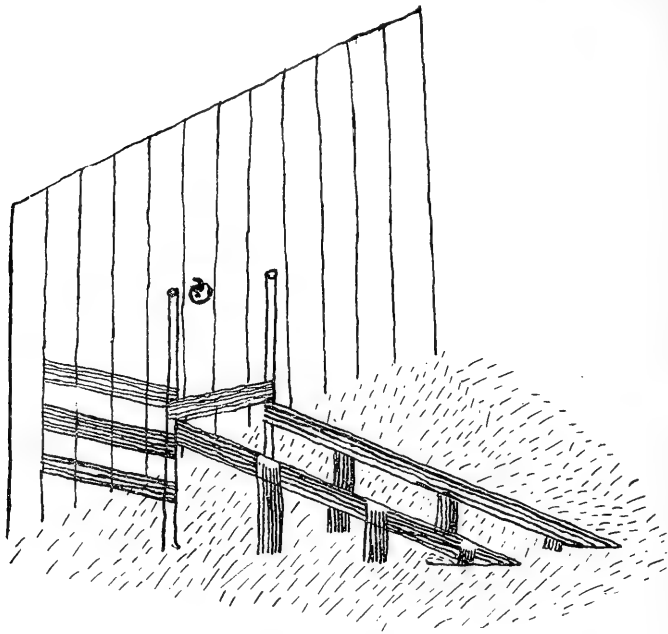


Figure 26. Breeding chute in which mares may be secured before breeding by natural service. This is not a necessity, but a great convenience, and assuring the safety of the mare.

plete service. By so doing, you will make a good server of him and keep him from getting into the habit of leaving the mare too quickly, which so often results in a withdrawal of semen.

All breeding should be done in a breeding chute, one of which is shown in figure 26. There are several reasons for this. In case a small mare is being bred, she has no way of twisting around and hurting herself. An 800 pound mare will hold up a ton stallion, if she will stand still, but the moment she begins to move about, she is likely to hurt herself. There is less danger of the stallion getting kicked. If the mare is tied close against the end and her head tied high by means of the ring as shown in the illustration, she can neither hurt herself nor the stallion. In case of small or short mares, a floor can be dropped in the bottom to raise the mare up to any height desired. The best services are always made by raising mares slightly taller than the stallion. Another advantage in the chute is in being an aid in handling colts or badly broken stallions. There are few mare owners in the country not more or less afraid of stallions. Accidents often occur as a result of this, when mares are simply being held. If in a chute, and tied securely, one has little trouble from any of these sources.

The Use of Breeding Bags. All unnatural forms of copulation should be avoided. The use of breeding bags and cervical plugs are not only harmful in themselves, but many a good stallion and jack have been ruined by their use. The act of copulation is made possible by the electric forces of sex. The stallion is positive, the mare negative. The use of any object which acts as a non-conductor of this interchange of electricity, has the same effect upon the animals as would masturbation. Many stallions refuse to serve with a breeding bag. They are wiser than their own-

ers who would require it of them. Others work with it fairly well for a while, but most of these soon have trouble. The most serious trouble is where they have difficulty in exhausting, and if the practice is indulged in for any length of time, this form of trouble becomes permanent. By all means abandon the use of all such devices.

The practice of letting stallions run in the yard or pen to be used for breeding is to be condemned. Mares will urinate more or less where breeding is done. If stallions have access to such places, one will notice that they are always smelling and straining to such an extent that their virility is likely to become impaired as a result. Unless stallions are permitted to run with mares all the time, they should never be permitted to run or exercise in yards that are used for mares.

Exercise. The exercise to be given the stallion has already received brief mention in this chapter, but the proper exercise for the stallion is so essential to breeding success, that to give the subject the thought it merits requires further mention. Those who are at all observing, have no doubt noticed that the foals sired by the several stallions in their vicinity differ in other ways than in breed or family characteristics. The get of one stallion will begin their existence in an enfeebled condition. Those of another stallion will be subject to some particular disease or weakness; others will sire foals with nerves wanting; while the foals of other stallions will be ushered into life with all the apparent vitality of a full grown horse. I know of one stallion siring some fifty foals in one season, about

forty of them being weak in the back, so weak in fact, that many of them died, and all had to be helped up for several days. Any physical condition common to a large part of a stallion's foals, is the result of some weakness or abnormal condition of that stallion. This is a fact worth remembering.

In times past, it has been the rule of most men to blame the mare for everything except that of producing a good foal. Slipping, backing heavy loads or any one of several diseases on the part of the mare, may produce foetal trouble, yet in a large per cent of cases, the stallion is at fault for the loss of foals. I have never owned two stallions producing foals of the same vitality. Even the loss of foals while yet in a foetal existence is quite often the fault of the sire rather than the dam. In tests I have made of the semen of several stallions producing foals dying just before or at birth, the spermatozoa were of low vitality in all of them. Two stallions will stand for service in the same district, often in the same barn, serving mares kept under the same conditions, and subject to the same local environment, yet the loss of foals at birth will be much larger in the case of foals sired by one, than of those sired by the other. An inherited weakness on the part of the stallion is one cause of this, while a want of proper exercise is another.

To prescribe a rule of work for stallions is no easy matter. What one man understands as work or exercise, another will convert into an abuse of the stallion. Then stallions differ so greatly in temperament, some actually requiring strenuous exercise to be able to give a good account of themselves in breeding, while

others require but little exercise to give good results as breeders. That every stallion in service should be given sufficient exercise to expand the lungs, quicken the circulation, strengthen the nervous system and harden the muscles, in order to be in a condition to beget the most and best foals possible, the breeding and quality of the stallion considered, can be denied by no one. The real question is how best to do it. Our light or harness breeds are generally given more exercise than our draft stallions, and they require it, as they possess a higher nervous organization. To use them in the harness for driving, is the best exercise that can be given them. Besides this kind of exercise will aid in stamping upon the offspring this same quality of speed or high acting, as the case may be. This principle as a factor in breeding, we should not overlook, for it is at work throughout all nature. The fighting instincts of canines and felines are always the most active at their season of mating. Antelope and deer whose natures make the quality of speed a defensive necessity, to aid them in fleeing from their enemies, always indulge this propensity in the extreme immediately before mating.

This law of Nature will apply to the breeding of draft horses. Leading or driving in a cart is better than no exercise at all, yet it is not the exercise we should give our draft stallions if we ever expect to build up a breed of good American horses to be used for draft purposes. Real draft work in the harness is the only exercise for a draft stallion. The plow, harrow, disc, mower, binder or farm wagon upon the farm, or the dray or heavy transfer wagon in town or city

is an exercise that will fit a draft stallion for producing foals of the highest quality, and possessing a vitality which could not be given them by a stallion not worked. In addition to this, such use of our draft stallions will prove a mighty factor in developing and transmitting from stallion to foal in a high degree, all those muscles required by the draft horse in moving heavy loads.

Nor do we need to stop working them in harness during the breeding season. The best success I have ever had with draft stallions has been by working them in the field during the first half of the day, then letting them rest a few hours, making their daily service at about four o'clock in the afternoon. There is very little danger of over-working a stallion in harness with only one service a day. If not abused, the harder he is worked, the better will be his foals. The strongest argument ever made in favor of the scrub stallion, is that he occasionally sires a foal better than himself. This is only because of the limited number of his services and hard physical work. He is always in the pink of condition from the breeding point of view. Those who have never seen the test made, would be surprised at the disclosures made by the microscope upon the semen of a stallion as usually handled, and again of the same stallion after being worked hard in the harness for sixty days.

Hard work and plenty of it, is the best thing that can be given a slow or indifferent server, and it will cure a large per cent of partially sterile stallions. The owner of a stallion owes it to the public, quite as much as to himself, to have his stallion kept in such a con-

dition as to insure his siring the very best foals. The difference in the value of a foal ushered into life with some weakness or of low vitality, can not be compared with one beginning life endowed with all the vigor of constitution inherent in his race. Many ills of the horse result from some inherited weakness, which more likely than not was the result of a want of physical exercise on the part of the sire. By the practice of giving our stallions more work and less drugs, will enable us to produce a much better race of horses. Drugs and stimulants should be scrupulously avoided at all times, unless prescribed by a qualified veterinarian.

Barns. No attempt will be made in this work to give plans or specifications for barn building. To intelligently do this would require a knowledge of the money to be used in the building. It would not be easy to find two men in the United States who had just the same amount of money to be used in building a barn. In fact, it requires very little money to build a good home for a stallion. I have never had better success as regards the health and breeding condition of stallions, than when I kept them in an open shed. This refers to stallions not at work in the harness. The more light and air the better. If one side of a building only is out, the wind will not draw through to endanger a horse. Stallions or other horses kept with such a shelter, never have colds, and the open air is Nature's best tonic for all animal life. If kept in a barn, the stall should not be less than ten feet high to ceiling, so that air can be admitted from near the top so as not to blow directly upon the horse. Too much light can not be given. If a stallion is not to

work in harness he should be given a box stall 12x16 or larger. I am now using stalls 12x16 feet with a paddock attached 16x40 feet. This is fenced tight and eight feet high. During the greater part of the year the stallions have access to the paddocks night and day. In stormy or very windy weather, they are shut in the barns at night.

I have been using cement floors for my stallions for many years, and with a noticeable improvement to their feet. Wet or moist floors and wet pastures make soft feet and a soft foot is always a poor foot. All animals grown in high and dry situations have good high feet with thick strong walls, while animals grown in low and wet situations, have soft feet with poor thin walls. Another advantage the cement floor offers, is that of cleanliness. It is easy to keep clean, and at least once each week should be scrubbed out with boiling water, when it should be well sprinkled with some coal tar disinfectant before bedding is replaced.

CHAPTER V.

THE SELECTION OF A BROOD MARE.

Femininity. What masculinity is to the stallion, femininity is to the mare. The stallion should be positive, the mare negative. The hard, determined expression of the stallion should be changed to one of mildness and softness in the mare. The massive jaw, the muscular crest, and the action expressive of great power in the stallion should in the mare be represented by refinement of character. A greater length of loin, and a wider and deeper make of rib should also be found in the mare. The mare is Nature's receptacle, to receive and develop the creation of the stallion. Other things being equal, the more feminine the mare, the better and surer breeder she will prove herself to be. I have observed that barren mares are more masculine than feminine. A lack of the sex characteristics is good evidence of a lack of procreative power. Castrating colts while young, causes them to develop more like mares than stallions. Unsexing mares by removing their ovaries while young, will cause them to develop coarser, more like horses than mares. The same may be said of everything pertaining in any manner to sex. In selecting brood mares, great care should be exercised in selecting only those showing feminine character, which means they are well sexed. All brood mares famed



Figure 27. A Percheron mare of quality, and her foal of two months. Note the extreme femininity of this mare, as indicated by the refined head. This mare combines size and quality to a high degree. The foal is the result of a capsule service.

for their excellence in such a capacity are always found to be of the most pronounced feminine type. Note the extreme feminine character as indicated by the refined head, ear, jaw and neck shown by the mare in figure 27. This mare produced a foal of the highest quality, every year for many years. It is not necessary that a mare should be undersized to be feminine. Some mares of extreme size are much more refined and feminine than others of less size.

Stallioners Owning Brood Mares. One or more pure bred mares should be owned by every owner of a high class stallion. Even if the owner of a stallion lived in town, he could well afford to own a high class mare of the same breed to which his stallion belongs. In the first place, nothing would help him in securing patronage for his stallion, from among the better class of men, so much as to be able to show a foal or two of the highest quality. Then again, the rearing of a good pure bred foal every year would add much to the profits of his stallion, enabling him to keep a strictly high class horse. Nothing so encourages the horse breeding industry in a community, as the pure bred mares which may be owned there. A good pure bred mare has been the means of causing many men to breed better horses.

Where to Buy Mares. The purchasing of a pure bred mare has ended in many a disappointment. In times such as the present, when no legitimate business is paying such a revenue on the investment as the draft mare of quality, is a fairly good reason why such mares known to be producers are rarely offered at public sales. Those who have purchased mares at such sales, only to find in the years that follow, to have purchased a gelding

would have proved just as profitable as many. I have seen mares respond to the call of a stallion, while being sold under a positive guarantee that she was safe in foal.

There are two rules in buying mares, which if followed closely will rarely result in a disappointment. The one is to buy mares only with a foal at foot. Such a mare has proved herself a breeder. The other is to buy young fillies, and only of the man who bred them, that their sire and dam may both be seen. The latter plan is preferable, as by this way more may be known of what to expect of the filly, both as to her proving a producer, and the quality of her foals.

This brings up the question of pedigree or certificate. Many believe if an animal is registered, it must be a pure bred. It does not need to be, and very often is not. Many mares and stallions are being sold every day with certificates that are far from being pure bred. They are known as top-cross animals and are far too common in the Percheron breed and stud book. High officials in the association of this breed are offering many such in their annual sales as shown by their catalogs. Such horses are only grades with a certificate and while these certificates may have a value of their own to a dealer, to a reputable breeder, they have no value whatever. However, if one has had no experience with breeds and pedigrees, he does not need to be deceived by these top-cross certificates. If the dams of any animal registered can not be traced back to an imported dam, that animal is only a grade. The following certificates, both taken from the stud book of the Percheron Society of America, will illustrate this point, the first one being a pure bred:

Collector—No. 60152.

Sire: Tremont 33647, by Duc de Broglie 2368 (1145),

by Brilliant 1271 (755), by Brilliant 1899 (756), by Coco II (714), by Vieux Chaslin (713), by Coco (712), by Mignon (715), by Jean le Blanc (739).

Dam: Selma 46354, by Bayard 10959 (20891), by Luther 4093 (212), by Luther (792), by Pierre (887), by Laboureur (886), by Jean le Blanc (739).

2d dam: Niobrara 44715, by Bolet 14217 (19799), by Sans Souci 7100 (6070), by Snow-flake (107), by Avata 1966 (912), by Nogent 738 (729), by Vidoeq 483 (732), by Coco II (714), by Vieux Chaslin (713), by Coco (712), by Mignon (715), by Jean le Blanc (739).

3d dam: Myra 6068 (Paquerette 6139), by Cheri (5464), by Mouton, etc.

4th dam: Rosette (6134), by Selim (749).

It will be noticed in the above certificate that the third and fourth dams are both imported, as indicated by the numbers in parenthesis.

The following is the certificate of a so-called top-cross or grade:

Cinq.—No. 54895.

Sire: Costa 42290, by Leroy 21193, by Mithridate 20535 (35918), by Archimede 11411 (7222), by Voltaire 3540 (443), by Brilliant 1271 (755), by Brilliant 1899 (756), by Coco II (714) by Vieux Chaslin (713), by Coco (712), by Mignon (715), by Jean le Blanc (739).

Dam: Octo 25483, by Hercules 19985, by Messidor 11567 (22456), by Forban 7368 (5374), by Picodor (5391), by Picodor.

2d dam: Cathrine, by A' Venture 1448 (803).

3d dam: Cath, by Premeier II 1451.

4th dam: Calebs, by Emperor 658.

5th dam: Carlo, by Chartres 518.

It will be noticed in the above certificate that the dams do not trace back to an imported mare, and that only the first dam is registered. Therefore the colt Cinq. No. 54895 is only a top-cross, being of the sixth cross and possessing sixty-three sixty-fourths of Percheron blood. If the other sixty-fourth part of the blood of this colt was of any of the other draft breeds, no harm could result. It is because of not knowing of what this outcross consists, that we should not use such horses for breeding purposes. It may be any of the small breeds, or even of an Indian pony. As soon as the American farmer and breeder understand what this means to the future of the horse breeding industry, such horses will be given no place in breeding.

Then there are other certificates given with both stallions and mares by unscrupulous dealers, possessing no value whatever. There are a few associations in the country quite ready to register anything for the fee. In buying such horses, one is always buying a grade with a pedigree, which is used only as an aid in making the sale.

In conformation, the draft mare should not differ from the draft stallion. Size, the sloping pastern and shoulder, good feet, and hock of the best, both as regards quantity and quality, should always be demanded. If good foals are desired, good mares must be a factor in their production. A good and well sexed stallion, with correct conformation may be able to sire very good foals when mated with only ordinary mares, yet we should not expect him to do it all. The best horses are possible only by the use of good mares.

CHAPTER VI.

THE CARE OF THE BROOD MARE.

The mere ownership of a mare does not mean that one owns a brood mare; yet, if a mare refuses to produce her kind, it is the fault of the owner and not her own. Nature made every entire female a breeder. If you own a mare of breeding age, and she does not breed, ask yourself why. About twenty years ago, I purchased some mares in eastern Iowa and Illinois. These mares were from three to nine years of age, and the most of these were sold only because they would not produce. In April, one hundred and one of these mares were turned out to range in the northwest part of South Dakota. They were all large mares of draft blood, weighing from 1400 to 1700 pounds. About the first of June, I began breeding them to an imported Percheron stallion. The mares were all driven into a corral every Monday and Thursday. All mares in season would be bred upon those days by making one natural service and capsuling the others. I made but two services each week with the stallion. In thirty days, every mare had been bred once. Some were bred as many as three times during the season. The next spring, these 101 mares produced fifty-three live foals. The next year, they produced ninety-one live foals, handled and bred in the same manner. The third year, every mare had produced at least one foal,

and yet many of their former owners were honest enough to tell me the mares he was selling were barren. The two oldest mares were nine years of age when I bought

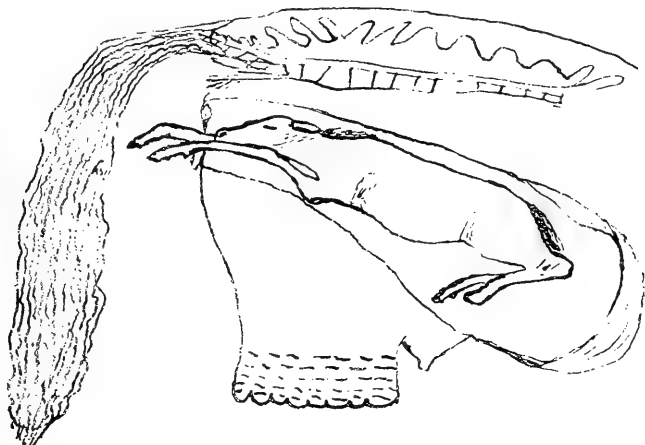


Figure 28. A normal anterior presentation.

them, and their owner told me he would not think of selling them if they would breed. He had bred them every year from their third to their eighth year, but with no results. With such a record behind these mares, and with nothing having been done to aid them in breeding, but simply turning them back to Nature, every mare proved herself a producer.

No one thing which I have tried to impress upon the minds of farmers and breeders, and with so little effect, is the need of better care of mares in foal, and those they wish to breed. They will drive an in-foal mare six or eight miles to town and tie her to the hitch rack. They will work them until they are warm, and then let them

stand in the wind until chilled. They will even drive them to a buggy; use them in deep mud and upon slippery roads without shoes; back heavy loads with them; in fact do scores of things with them every day which they should not do, and then wonder why they do not breed, or why they lose their foals. Because their grandfather's old Kate did these things and produced foals for many years, is conclusive proof to their minds that all mares should be treated in the same manner.

For more than twenty years, I have classified my country patrons into: Breeders, grain farmers and hay farmers. Those designated as breeders made the breeding of live stock their chief business. The grain farmers made the growing and marketing of grain their specialty. The hay farmers grew and marketed hay. The table below will show how they stand as breeders.

Class	No. of Mares Bred	Average Age of Mares	No. of Foals	Per Cent of Foals
Breeder	5146	9.6	3447	67
Grain Farmer	3297	9.3	1747	53
Hay Farmer	2674	9.9	1042	39
Average	<u>11117</u>		<u>6236</u>	<u>56</u>

It is a long call from 67 per cent down to 39 per cent. What a difference to the stallion owner! We do not have to go far to learn why the hay farmer produces so few foals. In hauling his hay to market, he will be out in all kinds of weather and upon every known condition of roads. When he reaches the market his mares will be warm, and often required to stand out in the cold for hours. Colds and a general catarrhal condition are usually the result. Only this winter, I called the attention of a farmer to the fact that his mare was too

warm to be left standing in the cold. He thought differently, but only a few days after this occurrence one of his neighbors informed me that this same mare had aborted. In this table the grain farmer shows 53 per cent of foals. The same rule applies in a less degree. The more brood mares are used away from home and upon the roads, the fewer the foals. The breeder, regardless of the kind of stock he is breeding, produces a much higher per cent of foals, and for two reasons. His breeding and feeding of stock offers no occasion for his mares to be worked upon the roads. Secondly, the breeder is a higher type of man than the grain or hay farmer. He will always be found with larger sym-

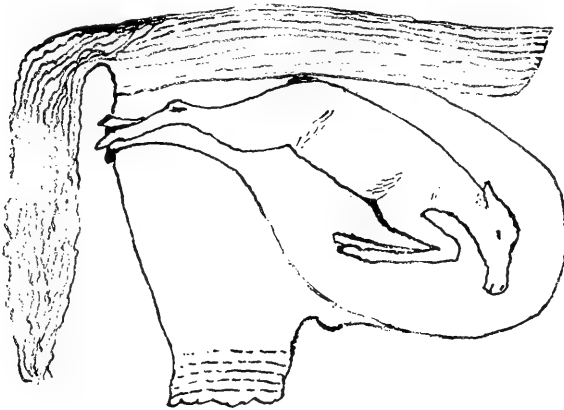


Figure 29. A normal posterior presentation.

pathies, which is a mighty factor in successful breeding.

Use of Mares. Much depends upon the occupation or general use to which mares are put, in the way of producing foals successfully. Upon this subject, I have

been keeping records also. I have classified them according to their occupation, into farm work, where they never left the farm; combination farm work and driving; driving with no other occupation; and saddle work. This does not include so many as the former table, because of not always knowing how to classify some mares; besides there are a few mares apparently used for several purposes. In this table mares were used only as specified.

Class	No. of Mares Bred	Average Age	No. of Foals	Per Cent
Farm work	2361	9.4	1605	68
Farm work and driving	2417	9.1	1305	54
Driving	1683	8.9	690	41
Saddle	264	7.9	76	29
Average	6725	9.	3676	54

Here we learn that the occupation of the mare has much to do with her as a producer. The above table teaches us that if a mare must work, her work should be something she can do at a slow pace. Where the occupation was farm work alone, the mares produced 68 per cent of foals; while farm work with driving gave only 54 per cent. Driving gave still less with a showing of 41 per cent. The saddle mares did not produce enough foals to justify a stallioner in breeding them, unless the fee be paid in advance. The pace they are required to make, coupled with the extra weight upon the back is fatal to breeding. While in the south during the winter of 1903, I met a breeder of saddle horses and he told me his per cent of foals was so small as to make the business unprofitable. When I learned that his mares were being used under the saddle much of

the year, I suggested that his brood mares be ridden at no time, nor for any purpose. Three years later, this breeder wrote me his foal crop had more than doubled since he began using his brood mares for breeding only.

Feeding Mares for Foals. Feeding has much to do with successful breeding, and it requires even more than a balanced ration for best results. Corn can be so used with bran, clover, alfalfa or other feed rich in

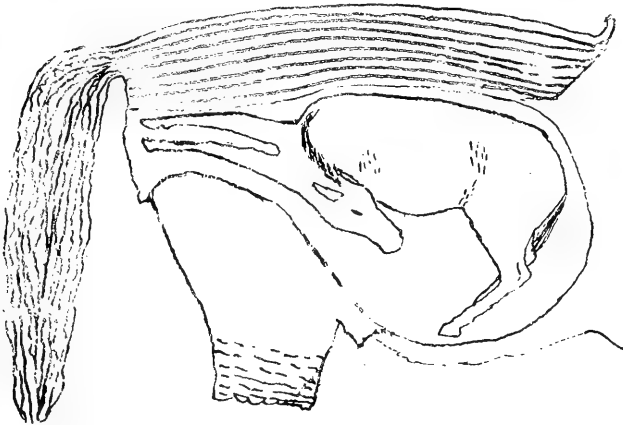


Figure 30. Anterior presentation, with head turned back.

protein, that chemically it will not differ from oats, yet mares fed oats will produce more foals than when corn is any part of the ration. Mares fed oats with bran will produce more foals, than those fed oats without the bran. Mares fed grass and hay with no grain, will produce more foals than when fed grain of any kind.

The following table speaks for itself.

No. of Mares Bred	Feeds	Average Age	No. of Foals	Per Cent
468	Range feed	10.1	425	91
183	Grass in summer; alfalfa winter	9.9	161	81
208	Hay, oats, bran	9.2	147	71
398	Hay and corn	8.7	195	49
231	Corn, bran, hay	8.9	117	52
306	Corn, alfalfa or clover	8.8	177	58
418	Hay and oats	9.	284	68

The mares in this table kept under range conditions were not worked. Those fed grass and alfalfa worked about one-third of the time. The others were selected because of being owned upon farms where good care and kind treatment was the rule. They all worked, but never left the farm. The rations fed were the same as had been used for many years. Nothing was left undone in the selection of these mares, to have every condition, other than feed, the same with all the mares. The results of this experiment is at variance with the opinions of many of our best breeders, but such facts are more convincing to my mind than the unsupported theories of any man. The question of feed is one of the unsolved problems of the American breeder. The question of soil in producing the same feed, is of equal interest. Alfalfa, for instance, grown in the corn belt is but little if any better than clover. This same plant grown further west at an altitude of 3000 or more feet is the best food for growing and developing a draft horse, ever grown upon mother earth. In bone, and muscle and the quality of both, nothing can compare with it.

Then again, there is corn. Chemically, there is no

reason why corn can not be balanced and made a good feed, yet in fact, unless the breeders of draft horses in the corn belt change from corn to some other feed, within a century their mares will all be barren. It has the same effect upon the stallions, as shown in Chapter IV. Either stallions or mares that have never been fed corn can be put upon a corn ration for a year or two without apparent injury. After that length of time, the injurious effect of the corn becomes noticeable. I have known many stallions to be fed corn, exclusively for their grain ration for three or four years, acquitting themselves nicely in the stud during this time, and then become sterile all at once. These same stallions were again made breeders within a year by simply substituting oats for the corn. The same has proved true of many mares. I have often succeeded in restoring to bearing corn fed mares that were supposed to be barren, by simply changing their diet from corn to other grain or alfalfa.

It is such facts as these that show the utter folly of attempting short time experiments in grain feeding. Such an experiment to be of the highest value to breeders should be conducted for a period of twenty years, or even longer. Theories may be all right in their place, but every known fact shows conclusively that corn is both debilitating and degenerating to the horse. The temperature of mares fed corn, averages higher than in the case of those fed oats or other grain. As to corn being a factor in degeneracy, I have made many extended observations. In the case of two lots of mares of the same breeding and quality, the one fed corn and the other oats or no grain, and both lots bred to the

same stallion, those fed corn always produced the poorer foals. These foals were not only inferior to the others as foals, but did not mature into as good horses. In many tests I have made of the bone of horses fed upon different grains, those fed corn always showed the weakest bone. In weight per cubic inch, it appeared to be as good as the bone of horses fed other grains, but as soon as it would be given the leverage test it was found pos-

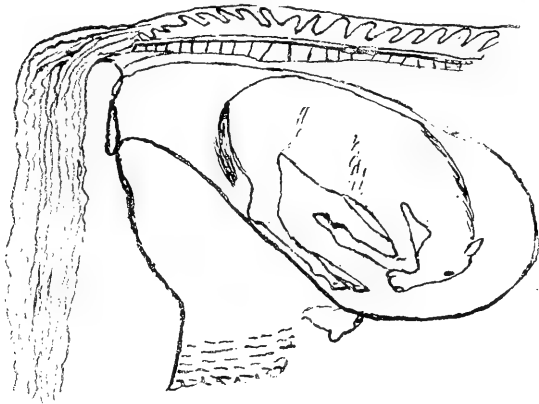


Figure 31. Posterior, or buttock presentation.

sessing very little strength. Those reared from their colthood up to maturity, upon an exclusive diet of western alfalfa, showed the best quality of bone of any draft horse tested. For the same breeding, the bone was larger, and greater in both weight and strength.

I shall not attempt to say why a corn diet has such an effect upon stallions and brood mares, for I do not know. To be positive, concerning this question, I shall

want to experiment further. However, this fact I have settled to my own satisfaction, that corn is indigestible to any horse. It may be because of its indigestibility that the system becomes so impaired in all its varied functions, that degeneracy naturally follows.

Salt should be accessible to brood mares at all times. This will be discussed at length in the next chapter. Water should be given often, to avoid drinking too much at one time. There is danger of abortion if in-foal mares drink too much cold water at one time. Too much hay or other coarse food is neither good nor necessary for mares. As we have already seen, alfalfa is the best of all feeds. Clover should be well cured and placed under cover without any foreign moisture being permitted to reach it. Any hay which has been wet with rain during the curing process, is not very good for a brood mare. Good bright oat straw, free from rust is preferable to damaged hay. Corn stover well cured is good for both mares and stallions. Sorghum or sugar cane is a hazardous food for a brood mare. Upon one large farm where many mares were kept for breeding purposes, sorghum hay was fed for three years with good results, but the fourth year because of some condition of weather in curing, it caused the loss of more than half of the foal crop. The same experience has been recorded on several occasions. It may be fed several seasons without apparent injury, only to play havoc the next year. Millet should never be fed in any form to a brood mare. The same may be said of all those wild grasses likely to contain ergot.

The Stabling of Mares has much to do with their fecundity. In the early settlement of this country our

mares and horses were sheltered in cheaply constructed stables, in which the question of ventilation did not need to be considered. There were always enough openings in the stables of our early settlers to provide ventilation. Mares were much more fecund in those days than they are today. We did not hear of colds, and

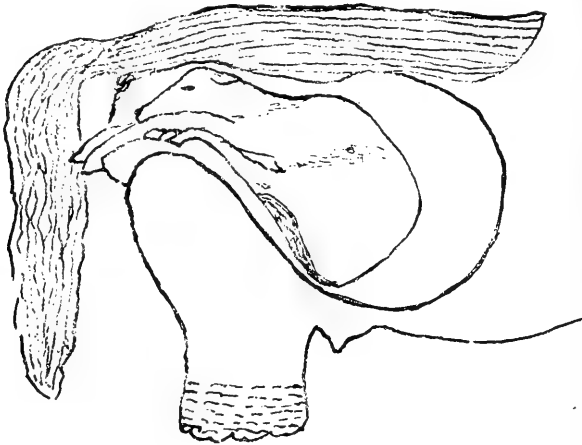


Figure 32. Louped, or doubled presentation, all four feet appearing at once.

coughs and influenzas in those times, as we do now. In modern times, the first thought of one in building a new barn is to provide against the cold of winter. Little thought is given the question of either light or ventilation, both essential to breeding success. If mares are to be worked during the winter they should be housed at night in a barn, but this barn should be built so as to admit of an abundance of light and air. Mention

has already been made in chapter IV, as to high ceilings, so that air can be admitted above the horses. These openings should be left open at all times.

Mares Running Out All the Time will do better, if they do not have to be worked, than those kept in barns of any kind. An open shed can be given them to run under during stormy weather. For several years, I have taken my pure bred mares out of expensively built barns, and let them run out at all times with only a cheaply built open shed to provide against storms. I have increased the per cent of foals considerable by doing this. Our modern barns are the source of much trouble to breeders because of being built warm, at the expense of sunlight and ventilation. Sunlight is the best germicide we know of, and the cheapest.

When to Breed Mares depends upon the amount of work required of them. More foals are lost from among the early ones, than from those coming later in the season. About eleven per cent of foals are lost before weaning time, from deaths and abortion. This is upon the basis of mares enfoaled. The losses from death following a normal birth to weaning time, is about 85 per cent before May first and 15 per cent after that date. The causes of these deaths will be taken up later. Because of this heavy loss early in the season, one should have their mares foal as late in the season as possible. This enables one to have the foals come when grass is good. There is no place so good for a mare to foal, as in a good pasture. Many of the worst ills of the young foal can be avoided by this practice. The danger of infection is thus reduced to a minimum, besides there is little danger of the newly born foal having bowel

trouble, if the mare has access to good grass. If because of the conditions of farm work, one must have some of his foals come early, he should have everything in readiness for them. A mare should never be kept tied in with other horses for three or four weeks before her foaling date. Many foals have been lost by doing this, as foals often put in their appearance long before they are expected. A mare about to foal should be given a good box stall, so constructed that the foal will have no way of crawling under the manger or getting into positions which will make it impossible for him to gain his feet. This stall should be kept scrupulously clean. If an extra stall can be provided, so much the better. As soon as the foal can stand upon his feet, and the placenta has been expelled from the uterus of the mare, they can be transferred to the clean stall thus avoiding as much as possible, all forms of infection. If the placenta has not been expelled within thirty minutes, and does not yield to very gently pulling upon it, the arm should be disinfected and inserted into the uterus. By gentle and careful manipulation of the fingers between the placenta and membranes of the uterus, the placenta can easily be taken away. There is nothing difficult about this, any man can do it, if he possess ordinary intelligence. The sooner the placenta is expelled, the better, as the uterus begins to contract very soon after the birth of the foal. This contraction of the uterus more tightly fastens its hold upon the placenta. If the placenta has to be taken away by force, it will be well to irrigate the uterus with a warm three per cent solution of carbolic acid.

Parturition may be expected anywhere from 315 to

360 days. If one knew just when conception occurred, he would know more about when to expect the foal. It may take place anywhere from two days to a month after service. I doubt very much if a mare ever carried a foetus twelve months, and yet we know of many that do not foal for even longer than that after being bred. A much larger per cent of mares do not conceive until the first heat following that in which they were bred, than any of us know. In a test of 46 mares that were returned in a condition to be bred three weeks from the date of a former service, 29 of them produced foals without being re-bred. This accounts for the phenomena of mares being bred to jacks, and then again three weeks later to a stallion, and producing a mule the next spring.

A Gestation Table embracing about 7,000 mares producing live foals, over which I had control and in which there can be no possible mistake shows the colts were carried an average of 336 1-8 days, while the fillies were carried 337 7-8 days. The shortest time was 297 days (a strong vigorous foal resulting), and the longest time was 391 days. The foal carried but 297 days was of a young mare that had produced one foal, and bred seven days later, resulting in this foal.

There is a certain rule by which one may foretell the time a mare will produce her foal. Generally this can be known by the enlargement of the vulva, the falling in of the muscles about the croup (relaxation), and the filling of the mammary glands and teats. A day or two before parturition the teats show a waxy substance at their ends, and frequently there is a flow of milk. But after all is said, one should not trust too

much to either time or appearance. As soon as there is a possible chance for the arrival of a foal, the mare should be placed by herself as already noted.

Sometimes there will be no sign or act upon the part of the mare of what is to happen, when all at once she will lay down and begin to labor. In the breeding of horses, no occasion ever presents itself, when the presence of a man with good nerve and a level head is so much in need as this. No domestic animal labors so strenuously, during parturition as the mare. If conditions are normal, a few minutes labor and all is over. If one is present at this time, he will soon see the first presentation, which is normally the forefeet, quickly followed by the nose. With such a presentation, one can help the mare very much by taking a foot in each hand and pulling as she labors. If your labor is in concert with hers, you can do no harm by pulling with all your might. By this help, one can relieve a mare of her foal quickly, saving her much wasted energy.

If the labor of a mare continues for any considerable time, say half an hour, with no presentation, one will usually find something wrong. Occasionally there will be a wrong presentation from the first, some of which are easily described. In a normal presentation, the bottom of the feet point toward the hind feet of the mare. Should the bottom of the feet of the foal point upward, the foal is either upside down, or else it is the hind feet presented. Some times one foot only is present, when the other will be turned back. At other times, both fore-feet will be presented, but the head and neck are turned back. Either of these two positions will cause the loss of the mare unless she has help. In

one instance, I saw all four of the feet presented at once, and yet the foal was straightened and taken away alive. Whatever the nature of a wrong presentation, the mare will need help and at once. In all such cases, a veterinarian should be called as early as possible. Delays in trouble of this nature are mighty costly affairs, as not only the foal is to be lost, but the mare as well. If a veterinarian can not be had, by all means try and do something yourself. Any man with strength and pluck, and some knowledge of the genital organs of the mare can do much if he only will. The first necessity is to know the foal is in such a position that it can be expelled. Sometimes when the presentation appears normal and yet the mare is unable to expel the foal, it will be found that one or both of the hind feet are bent under itself, and so far forward as to bend the posterior half into a loop or double. This position causes the hind feet to catch at the pelvis, making it impossible to pass through. Such a position is more easily corrected than many another. By pushing the foal back, the hind legs are easily straightened. The most difficult presentations I have ever met with, are those where the head is turned back, and those known as superior presentations, that is, where the foal is doubled, the back trying to come first. In the latter, it matters not which end you get first. The difficulty is in getting it turned. In such cases, after the mare had become quite helpless, I have used block and tackle to raise them behind, so that the foal by its own gravity will drop forward and downward, thereby helping greatly in turning it. Whatever the nature of the difficulty, one should never give up so long as there is life

in the mare. As a spur to greater efforts, one should always bear in mind that unless the foal is expelled, the mare is lost.

A mare should be fed grain very sparingly, both before and after foaling. Excessive grain feeding at this time is likely to result in the foal having trouble with its digestion. The digestive organs of a newly born foal are extremely delicate, and are easily deranged by injudicious feeding of the mare. If the season is early and the weather chilly, be careful and not let the mare have much cold water. Cold water in very large quantities during the four or five days after foaling, may cause trouble which will be mentioned later. It is much better and safer to give her warm water for several days. If the mare foals during warm weather, she can be trusted to drink as she has been accustomed to do. If the weather is warm, and grass is good, she will do better upon the grass than any other feed. If she is of draft breeding, she will need grain with the grass after the foal is a week old. None of the grasses in the corn belt contain enough nutriment to grow a good draft horse without grain. Then we must not forget that this mare must digest and assimilate food for two, and sometimes three, as she is generally rebred by the time the foal is ten days old. No grain will equal good, heavy oats.

CHAPTER VII.

BARRENNESS AND STERILITY.

Barrenness in Mares and Sterility in Stallions is more often the result of an inherited tendency than most of us are willing to admit. For many years, I worked systematically in an endeavor to learn, if I could, the basic cause of this tendency. Among other things, I tested the fluids (blood) of many stallions and mares as to the per cent of salt found in these fluids. For this work, I used both mares and stallions possessing all degrees of virility and sterility. The average for stallions was 71-100 of one per cent, ranging all the way from 5-10 of one per cent to 92-100 of one per cent. The mares showed an average of 76-100 of one per cent, slightly higher than the stallions. They ranged all the way from 54-100 of one per cent to 1.01 per cent. The stallion testing 92-100 of one per cent was one famed for his virility. With no exception they were stallions possessing a lower virility, as the per cent of salt showed a lower test. When 55-100 of one per cent was reached, the stallions became sterile or nearly so; five per cent of foals being the best showing made by any stallion below that test.

The mares testing 1.01 per cent was one that had produced fourteen foals in as many years. The same results

were obtained with the mares as given by the stallions; the lower the per cent of salt, the lower the fecundity of the mare. All mares testing below 6-10 of one per cent of salt were found barren. Here we have something tangible upon which to base the cause of this shy breeding tendency. This is a hereditary tendency, but it can be overcome in part at least, by feeding salt to all breeding animals. It was only last summer that one of the leading live stock journals of the country advised its readers to feed salt sparingly to their breeding animals. I have been feeding my stallions and mares all the salt I could get them to consume for many years, and with uniformly good results. It can readily be understood that salt could be forced into a horse by mixing it with feed in such quantities as to impair digestion. My method has been to have salt accessible to my stallions and mares at all times. In addition to this, I add a teaspoonful of salt to the feed of each stallion daily, and to the mares twice each week.

The Question of Breeds has something to do as to barrenness and sterility. From this view-point, the table below offers quite a study. These stallions were all pure-bred, about 70 per cent of all the breeds having been imported. They were owned and stood for service in the states of Iowa, Illinois, Kansas, Minnesota, Missouri, North Dakota, South Dakota and Wisconsin. All five of the breeds were represented in every state. The mares were such mares as came to be bred, the service registers being used to obtain the number of mares. The number of foals given are for the number actually found. This would be as fair for one breed as another. Some of the stallions were used at the same stand two or more

seasons, and the number of mares given include those for all the seasons. Only stallions owned by farmers who owned their farms are included in this table. These farmers might be considered above the average as horsemen and breeders. In gathering statistics for this table, a stallion was occasionally reported as sterile. In such cases, the mares bred were not tabulated. It was the performances of breeding stallions that I wished to obtain. The per cent of sterile stallions reported was: Belgians, 3.09 per cent; Clydesdale, 4.6; Percherons, 3.16; Shires, 5.02; Suffolks, none.

Breed	No. of Stallions	No. of Mares Bred	No. of Foals	Per cent of Foals
Belgian	219	29783	18168	61
Clydesdale ..	103	9241	4990	54
Percheron ..	613	83659	46017	55
Shire	321	41976	20571	49
Suffolk	27	2397	1554	69

The above table teaches us that the Suffolk leads, with a showing of 69 per cent of foals. The Shire is lowest with only 49 per cent of foals, a difference of 20 per cent. The Clydesdale and Percherons are about the same, while the Belgian is second in the table with a showing of 61 per cent. Breed then has something to do as to the number of foals, we may expect. Nor does the factor of breed effect the stallions only. It is just as plainly indicated upon the part of the mares.

The following table is a record for three years of American bred registered mares, owned in the same states as given for the stallions.

Breed	No. of Mares	No. of Foals	Per cent of Foals
Belgian	191	405	71
Clydesdale . .	78	153	65
Percheron . .	711	454	68
Shire	367	652	59
Suffolk	19	47	82

These mares were from four to ten years of age. All of them were worked some, but none very much. In this table, while the ratio varies slightly, yet the breeds hold their same positions. Imported mares of the same breeds are not so fecund. The act of importing itself is something of a factor in producing barrenness. The table below is a record of mares for the three years following that in which they were imported. If they were imported during the year 1900, the records begin with their being bred the season of 1901. This gave them a chance to recover from the ill effects of importing. The mares in both tables were those owned by small breeders, that is farmer-breeders, who would own from one to five such mares.

Breed	No. of Mares	No. of Foals	Per cent of Foals
Belgian	61	89	49
Clydesdale . .	17	19	38
Percheron . .	212	267	42
Shire	134	133	33
Suffolk	11	28	84

Again the breeds hold their same position as to fecundity, differing only in ratio. These imported mares were all of breeding age when they landed in this country, but this table makes a sorry showing for such mares during their first three years with us, the Suffolks

excepted. It is to be hoped they may do better in the future. Such a showing does not make them very profitable to their owners.

Feeding has much to do with the sterility of stallions. This was shown conclusively in Chapter IV. The feeding of corn to stallions, especially young stallions, has been the beginning of many disappointments. All kinds of feed having a tendency to produce a high temperature should be avoided. If stallions reach ten years of age in good physical and sexual condition, their sexual powers are not easily impaired by ordinary means after that age. This is because of the fact that only stallions of the greatest sexual power and vigor ever reach that age without becoming impaired. Many stallions start out with much promise in their early life, only to become of no value as producers by the time they are seven or eight years old. It is such stallions that need our very best care. Besides they should be used very sparingly in the stud.

Using Breeding Bags on stallions and jacks is a very common cause of sterility. No stallion or jack can be used with a breeding bag without positive injury. Thousands of dollars have already been lost in this manner. Natural copulation is effected by the interchange of sexual electricity. Any foreign barrier which is a non-conductor of this electricity will soon ruin the best horse in the world. Such a barrier has the same effect upon the stallions as masturbation. We have no need of training stallions to become masturbators, as there are plenty of them without this training.

Masturbation is another cause of sterility. Young horses acquiring this vicious habit are almost certain of

going wrong as breeders. If this habit is of long standing, it is almost impossible to overcome it. Nothing is better than steady work and a cooling laxative diet.

Vigor Tablets and other stimulants are frequent causes of sterility. Doping stallions with drugs can never do any good, and may do very much harm. In the first place no stallion ever needs that kind of stimulating. Good feeding and plenty of physical work is the best stimulant known. The nerves can be strengthened, the muscles made more firm; the circulation quickened and the performance of every function of the horse improved by work, better than by any drugs. There will always be grafters and quacks ready to sell one tablets and powders and tonics without end, but leave them alone.

Colds, Influenzas and many forms of sickness are the causes of temporary sterility, sometimes resulting in permanent sterility. Stallions partially sterile are likely to be made worse by these causes. There are stallions appearing in the best of health from October until April, and then annually go wrong for the balance of the year. Such stallions have little value as breeders, and it will generally prove more profitable to castrate them, than to spend time and money in trying to make breeders of them.

Cystic Degeneration of one or both testicles occasionally is the cause of sterility. Sometimes it is a cystic condition of the spermatic cord rather than the testicles, but in either case, there is no help for the stallion. This is made even worse, by being one of those difficult conditions impossible of diagnosing, except in the last stages of the disease. When discovered castra-

tion will make you a work horse, if not delayed too long.

Contagious Diseases of the generative organs will make both stallions and mares unprolific. A number of years ago, I was called into the western part of Nebraska, to examine some stallions that had very suddenly become sterile. In examining the semen with the microscope, the form of bacillus shown in figure 33 was disclosed. These stallions had proved to be virile under all circumstances,

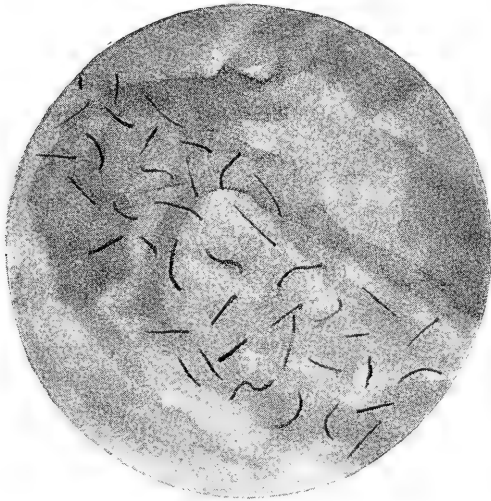


Figure 33. Microbes found in the semen of a sterile stallion. These germs caused the depopulation of several herds in the western part of the country.

when all at once they became sterile. Every mare served by them became barren and as a result of this highly infectious malady, several ranches were depopulated of their horses. No ulcers, cancers, or other outward mani-

festation was in evidence in the case of any of these stallions, yet in the semen of every one was found these germs.

Idleness or a want of proper exercise will lower the sterility of any stallion. The spermatozoa of idle stallions never have the vitality of those from stallions given daily exercise. Very few stallions wintered in idleness are capable of settling mares early in the spring, while those kept in harness during the winter are always in good condition at the beginning of the breeding season. Close confinement has been the cause of many stallions going wrong. All stallions kept in close quarters and without exercise will sire foals of lower vitality than if they had been properly exercised.

Overwork to the extent of causing a break down of the more important functions of the stallion, sometimes ends in sterility. I have never known this to be done except in the case of very young stallions, two years or less of age. I have known of several two year old colts to be completely broken down in constitution by overwork. There is little danger of this being done in the case of mature stallions. With them the work is too little rather than too much. If a two year old colt proves himself a breeder, but does not make a good showing later, there is something wrong with his handling. This happens quite frequently. The fact that he acquitted himself well in his two or even three year form, is conclusive proof that he is a normal breeder. Some stallions do very well for three or four years, and then become sterile, or nearly so at once. In investigating such cases, the following results were obtained.

Excessive use in breeding.....	183
Masturbation	98
The use of breeding bags.....	87
Too close confinement.....	39
Vigor tablets or tonics.....	67
Influenza (pink eye).....	11
Infectious diseases of a sexual nature.....	9
Overworking young colts.....	3
Fevers	4
No cause could be assigned.....	43
Total	<hr/> 544

Of the 544 stallions becoming sterile, after proving themselves breeders, 183 of them could be assigned to excessive breeding. These stallions were mostly abused as four year olds. It is not uncommon to see a stallion of that age required to make two or more services daily. Because of their trouble with dentition at this age, a four year old stallion should never be used upon more than 50 mares. There is no reason why a draft stallion should not be as virile at twenty, as at any earlier period of his life, and he will be if used and handled intelligently. The second largest number could be assigned to the vice of masturbation. This vice is not only making many sterile stallions, but it is making many others partly sterile. Breeding bags make a bad showing as does also the use of tonics or stimulants given to slow servers. That a stallion is a slow server is nothing against him. Some of the most virile stallions are exceedingly slow. Such stallions never need any drugs. A few minutes brisk exercise immediately before the service will do more than any drug. Diseases of various natures, also bring about sterility. There were 43 becoming sterile, for which no cause could be assigned. These stallions

had been properly exercised, had never been sick, were given the best of care and had never been used in excess in breeding. This makes it impossible to assign a cause, unless it would be the result of an inherited tendency. It is my belief that an inherited tendency to sterility was the cause, but as this is one of the things not easily proven, I am willing to give them an unassignable cause.

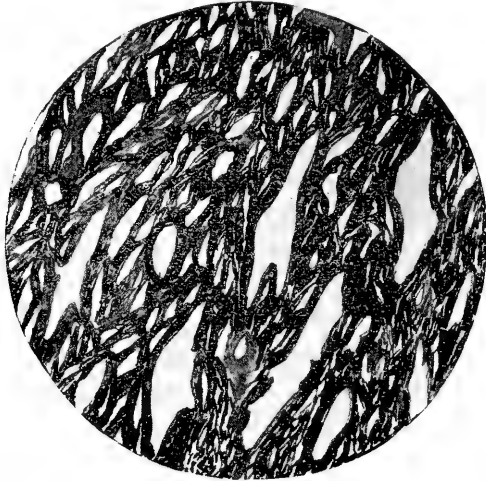


Figure 71. A section of the ovary of a barren mare. It will be noticed that no true Graafian follicles are present. (300 diameters.)

Mares with a tendency to barrenness will produce stallions inclined to be more or less sterile. Stallions partially sterile will sire stallions possessing the same defect. Upon the other hand, stallions of known virility and mares highly fecund are always the offspring of productive parents.

Again Taking Up the Question of Barren Mares, there are more agencies at work causing barrenness in mares than sterility in stallions. A mare will produce several foals in as many years, and then refuse to produce another, and all because of a congested condition, the result of a cold. The number of barren mares in the country is enough to discourage the breeder and stallioner. Since Nature made every mare a producer of her kind, if she does not reproduce herself, there is something wrong as to the manner in which she is kept.

Feeding has already been mentioned as having much to do with the fecundity of mares. It has also been noted that corn should be fed to a brood mare sparingly, or not at all would be better. The food for a brood mare should be slightly laxative, as constipation should never be found in the same barn with successful breeding.

Work in the Harness has much to do with a mare in the production of foals. I am of the opinion that a mare could be worked to advantage as a breeder, but she never has been, and most likely never will be. This was shown conclusively in chapter VI. It matters not what the occupation of the mare may be, in every line of investigation, the mares not worked produced the most foals. Occupation has much to do, that is the kind of labor. Slow farm work gave better results than any other occupation.

Among the Congenital Causes of Barrenness is that of rudimentary or undeveloped genital organs. The uterus and ovaries are the most likely to be undeveloped. One frequently finds an uterus in fully developed mares not more than one tenth normal as to size; sometimes a little larger, yet far below normal. The same is true

of the ovaries. Quite often they will be found very small, having the appearance of having suffered from atrophy, but as this condition is sometimes found in young fillies only two or three years of age, one can hardly take that view of it. But after all is said of such conditions, the fact remains that such mares do not breed. Such mares always appear masculine in character, and there is no way of making producers of them.

Another condition of the ovaries frequently met with, is that of abscess formation or cystic degeneration. This condition always results in a barren mare. This is more easily diagnosed than that of atrophy or rudimentary ovaries. Since the cystic condition enlarges the ovary to two or three times its normal size, which can easily be determined by way of the rectum. Only a little further back, we find another condition, which is a frequent cause of barrenness. In the middle narrow portion of the fallopian tube, a tumorous growth is sometimes found, completely closing the tube. This I believe to be caused by ova of unusual size stopping there, and which the system of the mare seems incapable of absorbing. This must necessarily result in barrenness.

Tumors are frequently found within the uterine cavity. They are of two kinds, fibroid and cancerous. Conception will never take place if cancer is present. The fibroid tumors do not always result in barrenness. It is only in cases of large tumors that mares fail to breed. These tumors are seldom found in the case of young or virgin mares. They usually begin their growth as a result of laceration or of a portion of the placenta having failed to be expelled.

Malposition of the Cervix often prevents the sperma-

tozoa from entering the uterus. The cervix or neck of the uterus will sometimes be found bent upwards or to one side. Then sometimes the muscles whose function it is to contract and dilate the cervix, contract it so tightly that it must be opened by the hand before spermatozoa can enter. These conditions are barriers to natural service only, as the capsule method of breeding finds no difficulty in settling mares of this kind.

Unnatural secretions, both acid and alkali are a source of much trouble to breeders. The acid condition is the more frequently met with. There are corrections for this condition, and they will be taken up later.

Catarrhal conditions are the cause of more trouble than all other conditions combined. This is the strongest argument that can be made against working brood mares, since this condition is never found in mares that do not work. Mares will be worked in the field or driven upon the road until warm, and then made to stand until chilled, when congestion and a general catarrhal condition follows. A few mares showing this condition will occasionally breed but only occasionally, while the greater number will not breed at all. This is but an inflammatory condition of the mucus membranes. With such a condition present, the foetus can not become attached to it.

Bacteria is another source of trouble in producing barren conditions. I have often found them in barren mares that otherwise appeared normal.

The one cause of barrenness in mares that has been the most overlooked, is that of a proper balance between the positive and negative forces of sex. A very positive mare will hardly ever conceive when mated with a stal-

lion positive and masculine to a high degree. This same mare mated with a passive stallion, may conceive at once. In like manner a very negative and feminine mare rarely conceives when mated with a stallion of the same magnetic temperament, but will conceive at once when mated with a positive stallion. When everything else fails to settle a mare, try a change of semen.

CHAPTER VIII.

THE CAPSULE METHOD OF BREEDING.

There Are Three Essentials to success in the production of foals. These in the order of their importance are fecund mares; virile stallions or jacks, and the uniting of these in a normal manner. So far as this subject is concerned, normality will mean anything not destructive of life in any of its forms, with which we have to deal.

The Impregnation of Mares can not be expected unless we have spermatozoa of a high vitality with which to do the work. The need of this has been shown in nearly every chapter of this work. Nor should we begin our work of breeding mares by the capsule method, until we know the stallion or jack that is to furnish these spermatozoa has been tested and found in breeding condition. One has no right to expect a mare to produce a foal, just because a capsule filled with some fluid of unknown quality has been inserted into her uterus. A stallion that is not a breeder by natural service, will not prove a breeder by capsule service. So far as the stallion is concerned, the only advantage the capsule offers, is in the fact that every service is a complete service, while the stallion makes only about sixty per cent of complete services. In the case of 1196 mares bred

by natural service, 19 different stallions being used, and the mares examined immediately after the service, 715 were found with no semen whatever in the vaginal cavity, while in the case of 481 of them, the semen, or a part at least, was deposited in the vagina. Here we have an average basis upon which to work. Some stallions make more complete services than others. Yet if we take all stallions into consideration, we will have only about sixty per cent of complete services. In equine copulation, Nature intended the semen to be deposited in the uterus of the mare. These forty per cent of incomplete services are the result of the stallion being too long in the penis; leaving the mare too quickly, or some malposition of the cervix. This gives the capsule method a great advantage over the natural service in the way of a better service. From the viewpoint of using the stallion it has another advantage and a very important one. In breeding small or crippled mares, there is no injury of danger to such mares.

Mares That Are Barren must not be expected to produce foals because of a capsule service. There are many mares that will not settle when bred by the natural method, that settle at once when bred with a capsule. Most of these mares will be found to be those with some malformation of the neck of the uterus. All such mares breed readily when served by the capsule method. Another advantage the capsule service has over the natural service, is the one of mare owners always being able to secure a service. It is disappointing, to say the least, for the owner of a mare to go eight or ten miles with his mare, only to find that service has already been made. In such cases, a mare owner has no choice but

to remain over night, or return home without the service. When the capsule method is practiced, the stallion can be billed to make his daily service at a stated hour. In this event, it matters not whether one, three or ten mares are on hand to be bred, they can all be served with one service of the stallion. During the season of 1908, I bred eleven mares with one service of a stallion, and ten of them produced live foals with no further service. The advantage of most value to the breeder in the use of the capsule method is in being able to breed mares when not in season. Mares bred out of heat settle more readily than when bred in heat. In a record covering several years, I have obtained nine per cent more foals from mares bred out of heat than from those bred when in heat. This makes it both convenient and profitable. Most mares do not take kindly to being served by the stallion, when not in heat, yet are easily served by the capsule method.

The Breeding Condition of the mare is the first thing to learn when mares are brought to you to be bred. With reference to this, the most essential thing is her age. The following table is for a period of twenty-eight years. The stallions used were all pure-bred stallions. Some of the mares were bred several times. The average per cent of foals resulting is given in the nearest whole number. This has reference to live foals only. The age given was that of the mares at the time they were bred.

No. of Mares	Age of Mare	No. of Foals	Per cent of Foals
103	2	30	29
127	3	57	45
304	4	121	40

No. of Mares	Age of Mare	No. of Foals	Per cent of Foals
413	5	215	52
627	6	401	64
873	7	637	73
941	8	753	80
1123	9	921	82
1064	10	809	76
979	11	656	67
819	12	499	61
731	13	384	52
614	14	302	49
591	15	169	28
421	16	101	23
379	17	64	16
272	18	43	15
201	19	25	12
122	20	14	11
97	over 20	9	9

This table shows that it does not pay the owner of a stallion to breed mares after they are fourteen years of age, unless the fee is paid at the time of service. A little better than 90 per cent of these old mares producing foals, were those with foal at foot. As long as one keeps an old mare breeding and in reasonably good physical condition, she is likely to continue a breeder. If she is not bred for a year or two she rarely breeds again.

The poor showing made by the two year old fillies is only because of poor feeding and poor development. Well fed and reasonably well developed fillies of this age breed as readily as mares of any age, while fillies that have not been well fed, do not mature an ovum of sufficient vitality to be capable of fertilization. In my experiments with artificial conception, I was never able to bring about conception with the ovum of an unde-

veloped filly but two years old, while an ovum from a filly of the same age, but well developed would always become fertilized.

The three and four year old mares make a poor showing because of trouble at this age with their teeth. Dentition at this time causes a somewhat congested condition, which is antagonistic to breeding. Even the five year old mares do not make as good a showing as those of more mature years. This table teaches us that by far the largest part of the foals are produced by mares from seven to eleven years of age. The nine year old mares leading them all, while those eight years of age are a close second. The mares for the ages of seven to eleven years inclusive, averaged better than 75 per cent, while for the entire number, it was only 57 per cent. The most valuable information which this table contains is in showing how rapidly one can lower his per cent of foals, by breeding mares of doubtful fecundity. This necessarily means a shrinking of profits to the stallion owner.

The Heat Period (Oestrus) is the next thing to be considered in capsule breeding. The most difficult things one has to overcome in breeding, are the superstitions of our early ancestors. Because their forefathers held to certain foolish beliefs, is proof conclusive to the minds of some men that they should hold to the same beliefs. That any one could be found believing a mare came in heat every nine days is difficult of belief, yet there are thousands of such men here in the United States who really believe such things. Then there are others who believe mares come in heat every fifteen days, and others again who believe it is eighteen days. If a

mare was bred upon the last day of one heat period and did not conceive, she would be in heat again fifteen days later, but this has nothing to do with the heat period, for this same mare would have been found in heat three weeks from the date of last service. The only way to determine the frequency of heat periods is to try them daily for two or three months, keeping a record of both the frequency and duration of such periods. In many such records which I have kept, I have found the heat period to be twenty-one days from the beginning of one period to the beginning of the following one. In all of the several thousand mares I have bred, I have always had them returned for trial twenty-one days after breeding them. There are a few irregular mares, some of them going thirty days or even longer between such periods, while others seem to be in heat nearly all the time.

The Duration of the Heat Period in mares is from four to nine days in the case of all normal mares. About 85 per cent go from five to seven days. We learned in Chapter I that the ovum is not discharged until after the heat period is passed. Because of this, the later a mare is bred the more certain she will be of conceiving. If she could be bred about the second day after the heat period has passed, she would be almost certain to conceive. It is safe to say that 75 per cent of all mares are bred too early in the heat period for best results. As soon as owners notice anything out of the ordinary with mares, they will rush them off to the stallion. This in many instances necessitates their returning them. It is not always convenient for the owner of the mare to take her to the stallion for service upon a certain day.

Yet he should aim to do so as late in her heat period as possible. It should be his purpose to work for foals when he has his mares bred. If he will co-operate with the stallion owner in this direction, many more foals would be the result.

The Temperaments and Habits of Mare Owners have much to do with the success of capsule or any other manner of breeding. Those men who are nervous, who are always in a hurry, or who can never get anything done soon enough to suit them, are men who produce but few foals. If a man wants foals, he must not be in a hurry, either before or immediately after breeding his mares. When I see men driving away with their mares after securing service for them, as if they had but a few minutes in which to reach their homes, I quite expect to do that work over again twenty-one days later. The men who own breeding mares, are men who are willing to devote a little time to the end that foals may be obtained. Such men are never in a hurry when they are having their mares bred. Nor do such men hurry their mares at any time of year. We have already learned that Nature has provided that no rushing of matters be done at mating time. We have learned that many visits to the mare are made by the stallion before they mate. We have further learned that mating is delayed until the heat period is well advanced. It will be well for all interested in the subject of foals to remember these things. Give the mare abundance of time to reach the stallion. Give her ample time after the service in reaching home, and do not breed her until the heat period is well advanced, or even past.

How the Mare is Taken to the Stallion has something

to do regarding the number of foals resulting. In a record kept of farm mares, used only for work upon the farm, and taken to the stallion in various ways, gives us the following:

No. of Mares Bred	How Taken to the Stallion	No. of Foals	Per cent of Foals
983	Driven double to wagon	631	64
819	Driven double to buggy	477	58
427	Led by halter	299	69
166	Ridden	69	41
<hr/> 2395		<hr/> 1476	<hr/> 61

Again these mares were selected because of the uniform condition under which they were kept when at home. They were all grade draft mares. The average age of each class was less than one year in difference. The class showing the largest number of mares was those driven in hitched double to farm wagon. These produced 64 per cent of foals. The next largest number of mares were those driven double to buggy. These produced 58 per cent of foals. At first thought, one would be inclined to believe the buggy would be the easier and better hitch. But the tendency or desire to drive faster when so hitched can not be overcome. It is the faster driving which produces the lower per cent of foals. Those led in produced 69 per cent of foals, the best showing made by any, while those brought in to be bred by riding them made a very poor showing, when the quality and condition of the mares are considered. It will be well for owners of stallions or jacks to advise their patrons to adopt any other plan of bringing in their mares.

The Preliminary Work, preparing the way for cap-

sule breeding is now about done. The next step is to prepare the operator for his work. The first thing for him to think of, and the one last to be forgotten, is the necessity of cleanliness. Microbes in countless numbers are present in the air, and upon every thing we touch or handle. Many of these microbes will destroy the vitality of spermatozoa. The first thing the operator needs in preparation for this work is the proper clothing. The clothing for this work is both simple and inexpensive. All he will need out of the ordinary is to have the sleeves removed from his undershirts, and to buy two white painters' suits, consisting of jacket and overalls. If the operator is right handed, have the right sleeve removed from the jackets. If left handed, the left sleeve may be removed. These suits should be worn only at the breeding hour, and should be kept scrupulously clean at all times. This can be done by frequently sending them to the laundry. When the breeding hour arrives, he should have removed his outer shirt, and be dressed in one of his white suits.

The Mares Should be Examined as they arrive, to learn if they are in breeding condition. The first thing as already recorded in this chapter, which is likely to have an influence in this matter is her age. If she is fifteen years or more of age, and has no foal at foot, it will be well to send her home without service, unless it is mere activity you are looking for. So small a per cent of such mares produce foals, one can not afford to breed them unless the service fee is paid in advance. The next thing to take notice of is evidence of any discharge from the vulva. One can usually find evidence of this upon the under side of the tail, by the hairs

being stuck together. Such mares have leucorrhœa, and should not be bred but sent to the veterinarian instead. Then look for evidence of congestion of the mucous membranes, or a catarrhal condition of the system. This can usually be told by the condition of the mucous membranes of the eyes. If they are inflamed, that is highly colored, the mare is not likely to breed. The normal color of the mucous membranes of the horse is a very pale rose color, or pale pink. If the color is red, congestion or inflammation is always present. This congestion may be of a temporary nature; the result of a cold, shipping, fast driving or any one of many things. In such cases, it may soon pass away, but for all that, very few mares will breed while in such a condition. It is always well to have such mares wait awhile, to see if they will not be later, in a better condition. Mares three and four years of age always show some congestion present because of trouble with their teeth, but we have already learned that they do not produce very many foals. If mares of such ages do not show too much congestion, I always breed them, as it is a help to the mare to have her in foal. If mares twelve years or more of age do not look right, I always send them away. If mares are discharging at the nostrils, I would not breed them. Only about 12 per cent of such mares regardless of age produce foals. One can not afford to breed them. When all mares have been examined and this need take but a very few minutes for ten or a dozen mares, have those found in condition be put in readiness for the service. This consists in placing them in the best possible position as regards security, yet never separating them from their mates, even though the mate is a gelding. When

this is done, they are ready for sexual examination, which consists in an examination of the cervix for contractions, malpositions and lacerations. If the cervix is found contracted or closed, open with the forefinger carefully and gently until a capsule can be inserted. If the finger can be inserted, it will readily take in a capsule. Do not make the mistake of opening the cervix to take in two or more fingers. The hardest condition in breeding to overcome is the large open uterus. If one finger can be inserted, that is sufficient. Regarding malposition, one has only to make it so a capsule can be inserted, when such mares breed as readily as any. If closed, open to admit one finger, otherwise do not interfere with its condition. Lacerations need the attention of a veterinarian. I have known those in very bad condition to be repaired, and the mares made breeders. Regarding lacerations, the one thing to always bear in mind is the condition an uterus must be in to seal itself so as to retain the foetus. If it be so lacerated, that the cervix can not contract and close or seal itself tightly, the mare is out of commission as a breeder. Lastly, we have the large, open or lax cervix, which almost every stallion owner has had every kind of trouble with. When we understand the cause of this trouble, the remedy suggests itself. This is a condition caused, first, because of the muscles running around the cervix, whose function is to contract and expand or open the cervix, have become partially paralyzed or impaired to such an extent that they can not close it. An impaired or debilitated condition of the vital functions of the mare is usually present in such cases. One should in such cases give the mare rest, and good, easily digested foods. In con-

nection with this, inject into vagina, each other day, a quart of warm water (body temperature) into which has been dissolved one-half teaspoonful of sulphate of zinc. Do this for ten days, then let her go a week without the injections. Repeat this work until the cervix closes, when she will be in readiness for breeding. This leads up to the tools for a capsule service.

The Tools for Capsule Service consist of a pan for warm water, some arrangement for heating the same, thermometer, quart bowl, a good quality of soap, towels, creoline, or other disinfectant, powdered slippery-elm bark and semen extractor. The pan should be made of galvanized iron or zinc. These metals will neither rust nor corrode. It should be four inches deep, six inches wide and thirty-six inches long. This will take in the extractor when the piston rod is drawn out full length. For heating the water, any device may be used, that is safe and capable of heating water quickly. I use a two-hole Perfection oil stove. Gasoline is unsafe about a barn. If the heater is to be used for breeding only, a one hole stove is large enough, which with a two gallon tea kettle will supply one with all the hot water needed. The best thermometer for registering the temperature of your water, is a floating thermometer, used by butter and cheese makers. Any thermometer of ordinary use will do, however, and these can be had as low as fifteen cents. The quart bowl is to be used to catch the semen in case of withdrawal. No particular kind of soap is necessary, yet the quality should be good. Soap has to be used so often during the breeding season, unless the quality is good, the skin of the arm is likely to be injured by its use. Towels should be

supplied liberally, and they must be kept clean, else they become the breeding place for myriads of microbes, which should always be avoided. Disinfectants must be used, and creoline or other coal-tar preparations are as good as any and the cheapest by far. Before making examinations of mares, disinfect the arm thoroughly, then wash it off with freshly sterilized water immediately before inserting it into the mare. No disinfectant must be carried into a mare which is to be bred very soon, as this would destroy the life of spermatozoa as well as other forms of life. The need of disinfecting the hand and arm before examining or breeding mares by the capsule method, is to prevent germs being carried into the mare. Powdered slippery elm bark is to be used as a lubricant. The best way I have found to use it is to keep some in a large tin pepper box, such as cooks use about the kitchen range. By dipping the arm in water, then dusting a little of the powder upon the wet arm, one has the best lubricant known. The extractor is one patented by myself. I am not recommending it because of that fact, for the patent I sold outright and have no interest left in it, either direct or indirect. I recommend it only because it is the only instrument ever invented capable of extracting the semen from the uterus of the mare. This instrument is known as the Carlson Semen Extractor, and is shown in figure 34. When it is known that 60 per cent of all services made with stallions, result in the semen being ejaculated or discharged directly into the uterus, shows one the necessity of having something that will extract the semen from the uterus, if we are to do very much in the way of capsule breeding. The secret of this extractor's success lies in

its soft metallic point, which is bent downward after being inserted, thus enabling it to reach and take up the semen as no other instrument can.

The Sterilization of all these tools by the use of boiling water is the next step in our work. Throw away all tools containing rubber, or other material which will not stand boiling water. One will get but very few foals by using such tools. Take every precaution in

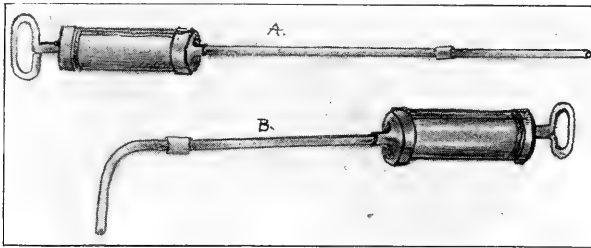


Figure 34. The Carlson semen extractor. A shows instrument as it is before inserting into the uterus. B shows the extractor with the point bent ready to take up the semen. Owned by the Kansas City Impregnator Co., corner 12th and Central Sts., Kansas City, Mo.

thoroughly sterilizing the extractor. When this has been done, and you have selected the best mare from among those examined, with which to make the natural service, you are ready to begin the real work of breeding by the capsule method. Mention has already been made that the best mare for the natural service has reference to size, temperament and health. If possible, she should be some taller than the stallion. The best services are always secured by using mares slightly taller than the

stallion. In temperament she should be quiet and level headed. Physically and sexually she should be in the best of health. Take no possible chance of spreading infection by using a mare of doubtful character as regards disease. When the best mare has been selected, place her in the breeding chute shown in figure 26, and have her securely tied. This chute is not a necessity, but a great convenience. If she is to be bred without the chute, do not trust to some one holding her, but always have her securely tied. Many services have given only disappointment, because of relying upon some one who was to hold the mare but did not. When the mare has been securely tied, have the groom lead out the stallion. While he is doing this, the operator should take the extractor filled with warm water in his left hand and the bowl filled with warm water in his right, taking a position at the side of the mare's left quarter as soon as the stallion has mounted and made a connection. When the stallion is about to dismount, empty the bowl and be prepared to catch any semen that may be withdrawn. If no semen is withdrawn, throw down the bowl, empty the extractor of its water, and as soon as the stallion is well out of the way, catch the point with the thumb and two first fingers of the right hand, and insert into vagina. Before leaving the operating room, the arm should first be lubricated with the slippery elm bark. If the semen was deposited in the vagina, it can be withdrawn into the extractor when the operator with his forefinger over the end of the point of the extractor, should at once start for the operating room, placing the extractor in the pan in which has been prepared the warm water at a temperature of 100 degrees F. Early

in the season when the weather is cold, the water can be prepared at 101 degrees, as it will cool the one degree by the time you wish to use it. If no semen is found in the vagina, insert the point of the extractor into the neck of the uterus, preceded by the end of the forefinger at all times, as shown in figure 35. Insert as far as can be reached with the finger, then press downward, bending the point with the forefinger over the top, and the thumb under the bottom. Pressing down firmly but gently will cause a depression to form in the bottom of the uterus which will cause the semen by its own gravity to occupy. With the point still held under the end of the forefinger, as shown in figure 35, so as not to draw in any part of the delicate membrane lining the uterus, begin to fill the cylinder of the extractor by drawing out on the piston rod with the left hand. When the cylinder is filled, straighten the point before drawing out of the mare and start for the operating room as before directed. Have your helper or assistant handle the extractor, which is to be kept under the water except when filling capsules. The finger should always be kept over the opening of the point, to exclude both air and water, when not filling a capsule. With a capsule in the left hand, which the operator should always keep dry, the assistant may fill not to exceed half full, when it may be capped and at once inserted into the uterus of a mare to be bred. The capped end should always be inserted first. Have the owner of the mare hold up the left fore foot of his mare while inserting the capsule. This will avoid a possible kick. This operation can be repeated until all the mares are bred.

An Operating Room can be made of an office room

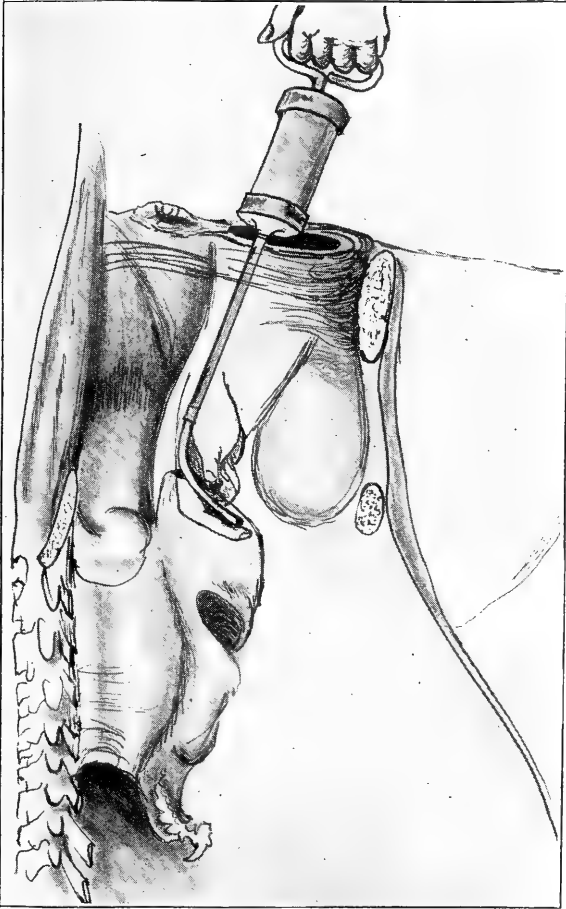


Figure 35. The Carlson semen extractor at work. Note the position of the finger in relation to the point. This is to prevent drawing the membrane of the uterus into the extractor.

or stall. Have as little light as possible, and still be able to see. Have the operating room or stall kept in a cleanly condition. In handling the capsules after they are filled, so handle them as to exclude all the light possible. If mares are returned for service more frequently than should be the case, and the stallion is known to be in vigorous condition, learn the cause. Something will be found wrong. When the trouble is discovered, it can easily be avoided in the future. If the stallion is right, and the mares are right, it is easy for the operator to be right. The early part of the season always gives poorest results. This is because every condition is against one at that time. The stallion is less virile, the mares are not in as good condition, and the weather is somewhat against one at that time.

The Capsules can be ordered through any druggist. There is but one capsule made intended for this work. They were first manufactured by the Parke-Davis Company of Detroit, Michigan, and are known as Number eleven. They are wholesale manufacturing druggists and sell this product to druggists only. These capsules should be kept in a clean place, the more sunlight in the room, the better. If kept very long, it is well to place them in a hot oven for two or three minutes occasionally. This will destroy any bacteria that may gather upon them. Remember if mares are bred while in heat, they should be returned for trial in twenty-one days. If bred when not in heat, they should not be returned until thirty days after service. In both cases, they should be retried weekly for three weeks if not in heat when first returned.

When I produced my first capsule foal in 1881, I did

more for the horse breeding industry than I knew at that time. By making one good stallion do the work of several poor ones, it is doing more to improve the horses of the country than any other one agency. Figure 36 is that of a foal produced with a capsule.

In case of bad tempered or kicking mares, there is no way so quick and easy in handling them as strapping up the forefoot with a strap. When a strap of this kind is properly adjusted, it holds itself in place. Great care should be exercised in exciting mares as little as possible. Mares excited at time of breeding rarely conceive. This statement is based upon very extended experiments upon that one condition. Only seven mares produced foals out of 203 wild Mexican mares bred by the capsule method. These mares were roped and thrown in order to make breeding them possible. In another experiment, conducted solely for the sake of the experiment, 117 domestic draft bred mares were put in casting harness and lowered to the ground, then bred with capsule, and let up. These were handled very gently, yet only nine of them conceived. Later the 108 remaining were bred by the capsule method in a standing position, semen from the same stallion being used, and 89 of them conceived. In both ways of breeding these draft mares, two spayed mares were used for all natural services. This should teach us that one should be very careful about exciting mares that are to be bred. It also teaches us why the rough, excitable owner of mares produces so few foals.

CHAPTER IX.

THE CARE OF THE FOAL.

The proper care of the foal should begin with the foetus at conception. No good horse will ever be developed out of a poorly nourished foetus. No time in the life of a horse can compare with its foetal existence, for the development of vital force. The half starved foetus means a horse of low vitality. If the stallion and mare were of good vitality, and in good health, at the time of conception, the foetus was ushered into being right. To keep up this foetal vitality, will require plenty of good, wholesome and nutritious food for the mare. She should have all she wants of a properly balanced ration, for she must eat and digest for two. I have never seen as good foals produced in the grain belt, as are produced further west. Where mares can have good western bunch grass during the summer and good western grown alfalfa during the winter, one gets the best foals the world ever produced. Here one finds bone and muscle as no where else. If the alfalfa hay is grown without irrigation, so much the better. Another factor most helpful in this western production of foals is the pure air, water and abundance of sunshine. This should be remembered by those producing foals in the grain belt. Keep the mares, summer and winter in the open

air as much as possible. The nearer we can follow that western ration, the better. Well cured clover hay and oats is as near to it as we will ever get. For draft mares doing no work, two pounds of good clover hay and one-half pound of heavy oats (oats that will test 32 pounds or better) daily, to the hundred pounds of weight will make a good ration. I have had better success with this ration here in the corn belt, than any other I have ever tried, alfalfa excepted. If mares are worked, more oats should be added.

Working mares too hard while carrying and developing their unborn foals is another way to produce a horse of low vitality. If a mare must work, she should not be hurried. Slow steady work does not injure a mare, even up to within a few days of her foaling date.

Parturition, and the three or four days following is a critical time, and a trying one in the life of a foal. A foal starting life in a feeble or abnormal condition can not be expected to develop into a horse of vitality. There are many cases where a little help in regulating the digestion of a foal would have resulted in developing a horse with a more vigorous constitution. As soon as a foal has been ushered into life, every precaution should be taken to prevent infection. The navel should be disinfected the first thing done. Any of the coal tar preparations may be used in about a five per cent solution. Or a 1-5000 of one per cent solution of corrosive sublimate is one of the best. Lysol is an excellent disinfectant, and may be used one teaspoonful to the pint of water. As to the umbilicus, never ligate or tie it in any manner. In doing so, one is most likely to lay the foundation for a case of pus absorption. Many prac-

tioners advise doing this, but it very often results in serious trouble. If ligated there is bound to be some blood, and perhaps urine, form there with no way of getting out, except by absorption.

Under Natural Conditions, the Umbilicus is always torn away at the body. Under conditions of domestication it will do this in at least nine cases out of ten. If it has to be cut, it should be about six inches from the body. In doing this, should the blood flow in a manner at all alarming, it can be ligated for a time with a cord that has first been well disinfected. In a few hours, the cord may be removed, when a thorough emptying and disinfecting of the remaining umbilicus should be made. To give this matter the closest attention may be the means of saving a foal. This is all the more necessary in the early season. Late in the spring and during the summer months, there is very little danger of infection.

The Proper Nourishment of the foal is the next thing to interest the breeder. Whether the foal sucks or has to be fed, it should be given the first milk of the mare. This first milk is known as colostrum, and has a purgative effect upon the foal, very much needed at this time. If the foal is reasonably strong, it will find the teat all right. If it should appear too weak to do this, the mare should be milked and the foal fed while the milk is warm. With one to hold the foal and another to do the feeding, this can be accomplished with a dessert spoon better than anything else. One or two feedings will usually result in giving the foal sufficient strength to find its own food. During the first twelve hours of its life, it should be known that the foal has voided its urine, and that its bowels are working nor-



Figure 36. The Percheron foal, Carlson's Standard, No. 66990. This is one of the high class foals of the year, and one of ten produced with a single service of the stallion. Foaled July 2, 1909. Sire, Nicholas 21997 (43394); dam, Selma 46354; 2d dam, Niobrara 44715; 3d dam, Myra 6068 (Paquerette 6139).

mally. The bowels are more likely to give the greater trouble. If there is trouble in starting the feces, a little olive oil injected into the rectum will generally start everything moving all right. If this does not bring about the desired results, one should not stop until all the foetal matter has been removed from the bowels. This may take several hours, but there is no need of losing a foal from trouble of this nature. In obstinate cases an ounce of castor oil may be given, and the rectum well irrigated with a warm soap suds, using only pure castile soap for this purpose. The first symptoms of this trouble is in the foal standing with its back arched, its tail erect and later its head and ears will begin to droop.

Dysentery at this time is not unknown although not a very frequent trouble. This is usually brought about by the condition of the mare. She may have been eating food such as moldy hay or grain, that caused the trouble. It may be her milk is too rich and the flow too liberal for its delicate digestion. In such cases, I have had my best success by milking away much of the mare's milk, and giving the foal every two or three hours a teaspoonful of lime water in a few spoonfuls of milk. Also reduce the grain ration of the mare for a time. If it does not yield to this, I would suspect infection to be the cause. In such cases a veterinarian should be called, as these cases can best be subdued by a serum treatment, which should not be undertaken by everyone.

Feeding the mare sparingly of grain until the foal is eight or ten days old will give the best results. The digestive organs of a new born foal are about as delicate as are those of a new born babe, and feed forcing should never be attempted during the first few days of its

career. When the foal has made a nice start, the feed of the mare may be gradually increased. If good grass can be had at this time, by all means let both mare and foal have it. Good clean oats may be fed a foal when it has reached three or four weeks of age. Only a few at first, and when it has learned to eat and relish them nicely, it may safely have all it wants of them until weaning time, which should take place when the foal is about five months old.

Should the Mare Have No Milk when the foal is born, let it suck just the same. If the mare is suckled regularly every two hours or oftener, in most cases the milk flow will start before the third day has passed. In the meantime, the foal should be fed cow's milk. This should be continued until the mare furnishes the foal with all the nourishment it needs. The cow's milk should be prepared with great care lest you lose the foal. Into a pint fruit jar, which has previously been sterilized with boiling water, pour water to one-eighth full, and add one teaspoonful of granulated sugar, and fill with new milk from a fresh cow if possible. This should be fed warm, at the body temperature, and the pint will be a sufficient quantity for one feed, but it should be fed as often as every two hours. It is quite a lot of work to raise a foal in this way, but I have done it, and they made good horses. A nipple over the spout of a teapot is the best thing to use for feeding a hand raised foal.

Weaning the foal has already been mentioned in Chapter VI. This can be done as outlined there with no loss of growth. Simply dry the mare up by letting the foal suckle less often all the time. After the weaning process has passed, the foal should never want for either

pure water or wholesome food. No grain food alone will equal oats. If timothy or prairie hay is used for roughage, bran can be added to the oats, about half of each by measure. If alfalfa or good clover can be secured, the bran will not be needed. The bran made at small country mills is much better than that made at the large commercial mills. In the large mills, it is poorer because of taking everything out but the outer covering of the grain, and again because they have scouring machinery for scouring the grain which small mills rarely have. In the large mills, everything which can be used for nothing else goes into the bran.

An Automatic Feeder is the best way of feeding foals and weanlings. By this means the foals can have grain whenever they desire it, and yet at the same time, they can neither waste nor soil the feed. If the best possible weights are wanted at maturity, this is a good way to feed until maturity is reached. It is impossible to grow the big ton horses without plenty of good feed. Another advantage in the automatic feeder is that it compels the foal or horse to eat slowly. This results in a more thorough mastication, obviating those forms of indigestion which are caused by too rapid feeding.

Exercise is even more important than feeding, if the best quality of horse is desired. There is no way known of developing good bone, and muscle and vital organs, except by exercise. The foals should have a large place in which to run and play, and let them run to their hearts' desire. I often hear people express themselves in a way to cause me to believe they might hurt themselves. They will hurt themselves more by being denied this privilege. In the summer time, all colts should be at

pasture. Here they can get both exercise and the best feed for all growing animals.

The Feet of the foals and yearlings and two year olds as well should be kept in the best possible form. This will require trimming occasionally. If a foal is inclined to go over on one side with a foot, trim upon the opposite side only. Never cut away the frog from the foot of a foal or growing horse, and never pare down the heels.

Handling the Foal properly during its early life, will add much to the value of the future horse. Gain its confidence early, and then never deceive the foal. It delights in being handled and fondled as much as an affectionate child. Its future is at stake, and it should be so handled at all times with a view to making it trustworthy at maturity. A foal or horse will do almost anything for sugar, but sugar should be given as a reward for good conduct, rather than a ration. In very large quantities, sugar is not good for a growing horse.

CHAPTER X.

DISEASES OF THE HORSE.

Only those diseases likely to be of interest to the breeder will be discussed in this chapter. If one has a thousand dollars or more invested in a stallion, he can illly afford to let him die, if there is any way known of saving his life. It is because of this large investment in a single individual that makes the usual home treatment unprofitable in a very large per cent of cases. It is in diagnosing a case one finds the greatest difficulty. Even in colic and other diseases of the digestive organs, one often meets with great difficulty in learning the real trouble. Because of this, if it is possible to obtain the services of a veterinarian, it will prove a good investment to do so. Sometimes a veterinarian can not be had, and under such circumstances one should do the best he can. In diagnosing the ailments of horses, one need expect but little of breeders, when it is remembered that this is the one great and most uncertain task of veterinarians.

Colic in the horse occurs in various forms. Engorgement colic, obstruction colic, flatulent, or wind colic, spasmodic, or cramp colic, and worm colic are the most common forms. If a horse evinces abdominal pain, he is likely to be put down as suffering with colic, even

when the difficulty may be an internal hernia, overloading the stomach, or even a bladder or liver trouble. Inguinal hernia is likewise often mistaken for colic, hence one can see the absurdity of advising treatment at long range. If the horse is a valuable animal, no time should be lost in placing him in the care of a veterinarian. The more valuable the horse the greater the need of this.

Engorgement Colic is caused by overloading the stomach with food. The horse may either be overfed, or else the stomach as a result of some cause may have failed to digest the food and pass it backward into the intestines. Greedy eaters are most predisposed to this disease. The one symptom likely to result in a correct diagnosis of this disease is attempts at vomiting. These movements are shown by labored breathing, upturned upper lip, contraction of the flank, active motion at the throat, drawing in of the nose toward the breast, causing high arching of the neck. Following retching, gas may escape from the mouth, and this may be followed by a sour froth and some stomach contents. The horse can not vomit except when the stomach is violently stretched. If the accumulation of food or gas is great enough to stretch the stomach so that vomiting is possible, it may be great enough to rupture this organ. But after the stomach ruptures, vomiting is impossible. This condition of the stomach is generally made known to us, as soon as food is thrown out through the nostrils. The death rate from this form of colic is higher than in the case of any other.

Obstruction Colic usually is known as impaction of the large intestines. It may be, however, the obstruc-

tion of the digestive tract by accumulations of partly digested food, by foreign bodies, by displacements, by paralysis, or by abnormal growths. It is generally caused by overfeeding, or the feeding of old dry hay, or stalks, superinduced by a deficiency of the secretions of the intestinal tracts. The last named condition may be brought about by lack of water, or the use of too much strong medicine. The only treatment in this form of colic that can be effective is to produce movement of the bowels, so as to prevent inflammation of the same from arising.

Flatulent, or Wind Colic is caused by any thing that may produce indigestion. The chief symptoms of flatulent colic is the distention of the bowels with gas. The symptoms of this disease are not so suddenly developed nor so severe as those of cramp colic. At first the horse is noticed to be dull, paws some, and the abdomen enlarges. The pains from the start are continuous. If not soon relieved the symptoms are aggravated, and in addition there are noticed, difficult breathing, mucous membrane highly colored, profuse perspiration and trembling of the front legs. This form of colic is much more fatal than spasmodic colic. The treatment differs very materially from that of spasmodic colic. An injection, per rectum of two ounces turpentine in eight ounces of linseed oil may safely be given every thirty minutes to stimulate motion of the bowels and favor the escape of wind. The removal of the gas from the bowels is the essential thing. Under the direction of a veterinarian the bowels may be punctured with a small trocar or needle of a hypodermic syringe. This has often saved the life

of a horse, and can be done with no danger if made with a clean instrument.

Spasmodic, or Cramp Colic is produced by the contraction, or spasm, of a portion of the small intestines. Spasmodic colic is more frequently met with in high bred, than in large draft horses.* It is produced the same as external cramps are produced, by the unequal distribution of the nervous supply. Drinking cold water while warm, or the sudden lowering of the temperature of the body are the most frequent causes. There should be little trouble in diagnosing this form of colic from any other form, yet there frequently is. One should keep in mind that in spasmodic colic the attack is sudden; the pain violent, with intervals of ease, the temperature and pulse normal during the intervals of ease, and that frequent attempts to urinate are always made. The treatment should be something in the way of an antispasmodic, since the pain is due to spasm or cramp.

Worm Colic is a symptom rather than a disease. In many cases of extreme worm infestation, there are colicky pains at times, such as switching of the tail, frequent passages of manure, and at times some slight straining. About every other man one meets has a "sure cure" for intestinal worms in horses, but if plenty of well cured alfalfa hay be given either horses or colts, no "cures" will be needed.

Inguinal Hernia is frequently mistaken for colic. Within a few minutes after an accident of this kind occurs, the horse will become restless. He will jerk up the hind legs, kick at the belly, and point with his nose to the side. The symptoms will increase in se-

verity until the horse begins to sweat and roll as in some forms of colic. Inguinal hernia is but an incomplete scrotal hernia, and may exist and cause no signs of distress, or it may become strangulated and cause the death of the animal. Inguinal hernia is seen mostly in stallions, occasionally in geldings but rarely in mares.

Until about the ninth month of foetal life, the testicles of the male occupy a position in the abdominal cavity, similar to that occupied by the ovaries of the female. At about the ninth month the testicles begin to descend, and finally become lodged in the sac called the scrotum. In making this change a canal is formed called the inguinal canal, which connects the scrotum below and the intestinal cavity above. This canal is permanently occupied by cords, arteries and canals of the genital organs.

It will be seen then that there exists in the stallion and gelding an opening through which it is possible for the small intestines to pass into the scrotum. The passing of such intestines into or through this canal is inguinal hernia. If the intestines are crowded with sufficient force into this canal so that the circulation through the bowel is impeded, it is strangulated. Strangulated inguinal occurs much more frequently in the stallion than in the gelding. It is very serious and oftentimes a fatal accident.

It is easy for anyone with a slight knowledge of the anatomy of the parts, to understand that the position a stallion assumes during coition favors inguinal hernia. It will be observed that the testicle on the side of the hernia is kept tightly drawn upward in the in-

guinal region, and if the loop of the bowel has descended through the inguinal canal, it can be made out as quite an enlargement above the testicle. An examination made through the rectum is the only way to confirm the diagnosis, when any entrance of a gut into the canal can be felt from within.

The treatment lies in its prompt reduction. If recognized early, this can be accomplished by careful traction upon the hernial mass. Every care must be exercised lest laceration occur, and the longer the time of the hernia, the greater the care to be exercised. This is one of those conditions where the amateur is likely to do no harm, even though he does no good, and no effort should be spared in reducing the hernia in the shortest time possible. If the owner of a stallion does not succeed in a very short time, or if in the beginning of such an accident he feels himself unable for the task, a veterinarian should be secured as early as possible. In such cases one should remember, that the hernia must be reduced or the stallion will die.

Orchitis is another disease with which stallions may become afflicted. When not caused by blows or bruises, orchitis is likely to be the result of congestion, produced by excessive copulation, exciting the sexual desire without gratification, or heavy grain feeding with little exercise. By removing the cause, reducing the grain ration, increasing the exercise, the giving of some laxative such as two ounces of Glauber's salts daily in the food, and the bathing of the affected organs daily with hot water will usually restore the testicles to a healthy condition.

Hemorrhage of the Penis is generally caused by

blows, or the force used in entering small, constricted mares, coupled with too frequent service. The treatment may be rest from service for a few days, and the application of alum water to the end of the penis.

Maladie du Coit is a germ disease, and is propagated by the act of copulation. It is not unlike syphilis in the human subject, and is highly contagious, affecting both stallions and mares. It has depopulated a few herds in the western states, and as there is no satisfactory treatment of the malady, it should be stamped out by castration or death.

Anthrax is a germ disease, and until within very recent years the horse had always been considered immune. In the valleys of the upper Missouri river and some of its tributaries, it has made the horse breeding industry unprofitable. The disease is never present in the high lands of the west so far as the horse is concerned. The virus of diseased animals is disseminated in the excrement, which is often mixed with blood, and therefore with the microbes. The anthrax bacillus is shown in figure 37. They are straight cylindrical rods, usually associated in twos and threes, but sometimes in chains. The formation of spores does not usually take place until after the death of the animal. They multiply most rapidly under mean temperatures, yet when dry the spores will resist boiling water for some time. The bacilli are taken into the system with the herbage.

The disease shows itself by a fever, with more or less stupor of the patient. The blood is much changed, sometimes visible hemorrhages occur. The intestinal lesions in the horse often give rise to more or less

violent symptoms of colic. This complication, considered too exclusively, frequently interferes with the correct diagnosis of the essential disease. After death the blood is found to be de-oxygenated, viscid, the corpuscles altered, and the plasma colored red. The spleen is much enlarged. The intestines are sometimes the seat of intense congestive hemorrhagic lesions, and in some cases the lymphatic glands of the

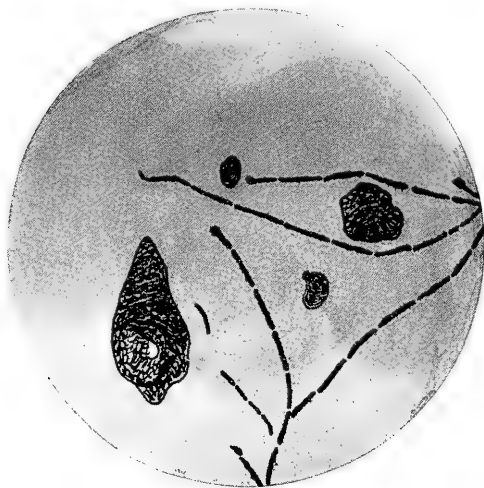


Figure 37. The bacillus of anthrax. (1000 diameters.)

different regions are in the same condition, and also enlarged to twice or three times their normal size. Similar lesions may also be found in the kidneys.

This is an unfortunate disease for the breeder, and it should be reported to the state veterinarian as soon as its presence is known.

Tetanus (lockjaw) is a germ disease, the bacilli being shown in figure 38. Breeders are likely to be troubled with tetanus to quite an extent, the infection following pricks of nails or abrasions of the skin. The bacillus does not multiply in air containing oxygen, because of which only deep punctures are likely to become infected. It is very resistant to heat, supporting the

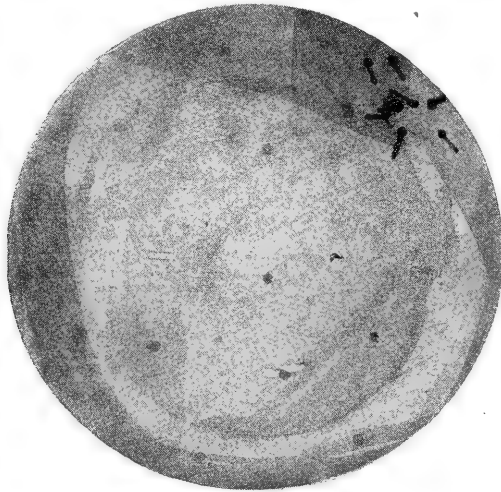


Figure 38. The bacillus of tetanus. (1000 diameters.)

temperature of boiling water for some time. It is but little sensitive to the action of antiseptics. To be infectious the bacilli require the cooperation of other microbes.

The disease is characterized by spasms affecting the muscles of the face, neck, body, and legs, and of all the muscles supplied by the cerebro-spinal nerves. The

spasms or muscular contractions are rigid and persistent. The first symptoms which attract the attention of the owner, is difficulty in chewing or swallowing, of moving, and the protrusion over the inner part of the eye of the membrane commonly called the haw. The jaws are set or locked, wholly or in part, giving use to the name of lock jaw. If the attack is acute, the animal will die within a very few days. If of a milder form he may be saved. Tetanus antitoxin injected beneath the skin with a hypodermic syringe, will afford a very high degree of protection. The patient should be kept in a quiet place, away from all other animals and noises. The bowels should be kept active by the use of cathartics. Mares infected with tetanus poison, seldom breed after, even though a complete recovery is apparent.

Influenza is another disease of the horse, and a very common one, that is of interest to the breeder. It is of especial interest to the breeder, because of its effect upon both stallions and brood mares. The latter if pregnant are very apt to abort. Young stallions are frequently made sterile by a severe attack of influenza. It occurs in several forms, such as equine typhoid fever, pink eye and others. When the visible mucous membranes are the principle seat of the disease it is termed pink eye.

It is a contagious and infectious fever, caused by a microbe shown in figure 39. Young horses and colts are more susceptible than mature horses, and one attack is generally self-protective. Very few horses contract the disease after their fifth year, and those kept in poorly ventilated stables experience a more severe

attack than those accessible at all times to pure air. The disease is known by its alterations of the blood, great depression of the vital forces, stupor and frequent complications of the lungs, intestines and brain. Occasionally an apparent recovery is followed by a severe relapse, sometimes proving fatal.

Good nursing is the best treatment. The animal



Figure 39. The bacillus of influenza. (1000 diameters.)

should have access to an abundance of pure air and sunshine but the wind should never be permitted to blow directly upon the patient. The patient may be allowed any nourishing food relished. The bowels should be made to perform their function promptly and regularly. If inclined to be constipated, small doses of Glauber's salts may be given. If the weather

is very cold the patient may be kept warm by blanket-
ing. In most cases no serious trouble will be exper-
ienced if the horse be handled so as not to take a cold.

Strangles is also an infectious disease of the horse,
colts being more predisposed than mature horses. It
is caused by infection by contact with an infected
animal or the discharges of an infected animal. The



Figure 40. The bacillus of strangles. (1000 diameters.)

germ or bacillus is shown in figure 40. It appears as
a fever, lasting for some time, with formation of pus
in the air tubes and lungs, and frequently the formation
of abscesses in various parts of the body, both near the
surface and in the internal organs. It usually leaves
the animal after convalescence in the best of condition.
About the only treatment necessary is to keep the

animal in dry quarters and feed a reasonable quantity of good wholesome food.

The swelling under the jaw should be watched and all blisters and irritating liniments should be kept away. These swellings may be bathed with hot water, and poultices may be applied. For such purposes no better poultices can be used than flax seed, with a little charcoal and creolin added. As soon as there is any evidence of the formation of pus, the abscess should be opened.

Pneumonia is another disease of interest to breeders, and it is only in the case of very young foals that I shall make mention of it. A large number of foals coming early each spring, appear all right when foaled, but within two or three days are dead. These mostly die of pneumonia, usually contracted during the first hour of their life. In the early spring while the weather is chilly and the air damp, unless a blanket is thrown over a foal until it is dry, it is in serious danger of contracting a cold, which more likely than not will terminate in pneumonia. Lying upon cold or damp ground is also dangerous.

The first thing to attract attention in cases such as this, will be a dullness and weakness of the foal. If at this stage of the disease the membranes of the eyes appear red, there is no help for its life, for it is sure to go. If the ear is placed at the side of the foal just behind the elbow, a rasping or rattling sound will be heard. After death, the autopsy will disclose a thick, dark blood, and the blackened lungs. All that can be done with such cases is to try and prevent them. One

thing that can be done is to have the foals come later. It has been shown in a previous chapter that the loss of foals is confined largely to the early ones. If one must have them come early, every means should be employed in an effort to keep them warm, and where no wind can strike them until they are well dried.



Figure 41. The bacillus of navel infection. (1200 diameters.)

Only think what it would mean, if a man was to take a hot bath at a temperature of one hundred degrees, and immediately step into a room without clothing where the temperature was as low as fifty degrees. That is what the young foal does in many instances, and resulting in the loss of many.

The Navel Infection of Foals is another disease resulting in much loss to breeders. This also, is a trouble of early foals. It is a true germ disease the bacillus being shown in figure 41. This bacillus can not be propagated without oxygen, hence is always found near the surface of the ground. Nor will it multiply at a high temperature, which accounts for its presence in the early spring. Wet situations are favorable to their development. Prevention is the best treatment, and consists of absolute cleanliness. Not only a clean stall should be given it in which to be born, but clean hands in handling it while wet, and the use of some good disinfectant two or three times daily upon the navel until it has dried and fallen off. Creolin, or any of the other coal-tar preparations are as good as any, and these can generally be found in every barn, and a five per cent solution can be used for this purpose.

Should the foal become infected, place him in the hands of a veterinarian as early as possible. There is but one satisfactory treatment, and it consists of a serum treatment, which should be used by a veterinarian only. The symptoms are lameness from swollen joints, and the lameness will pass from one extremity to another in quite rapid succession. Foals dropped upon grass which is daily exposed to the sun are always immune.

Leucorrhœa is a disease very discouraging to a breeder. There are but two primary causes, a want of proper nourishment, and congestion of the genital tract. The latter is often found in a catarrhal condition of the mare, a condition where some inflammation of all mu-

ecus membranes is present. There is more or less discharge, and of a nature all the way from a thin whitish and slimy substance, to a thick yellowish discharge. The hair on the underside of the tail is somewhat glued together. Mares in this condition should never be bred, as the disease is infectious, and nothing should be done to spread the infection. Only two or



Figure 42. Germ frequently found in barren mares. (1200 diameters.)

three per cent of such mares will breed, and only when the semen is introduced directly into the uterus.

There are thousands of mares in the country that do not show the usual discharge by which leucorrhœa is diagnosed, and yet do show a catarrhal condition, and they will not breed. These mares develop leucorrhœa

later if not given treatment before they reach that stage. In the treatment of this disease I wish to call the attention of veterinarians to the fact, that while the disease itself may yield as quickly to the permanganate of potash treatment as any other, yet the fact remains that mares do not breed, as a rule, after that treatment. I have been confronted with the problem of barren mares, where the condition of barrenness was the result of leucorrhœa in some of its many forms, for more than thirty years. It was not because of any desire to do it, but success in breeding made the solution of this problem an actual necessity. Mares with this disease, but of breeding age, are now giving me very little trouble. It takes much labor and some money to put such mares in condition, but practically every one of breeding age can be made a breeder.

It will be noticed that most mares in this condition, and I will include all mares of a catarrhal nature, are more or less debilitated. I look well to this first, and usually give a tonic twice daily in the feed, of ten grains sulphate quinine, ten grains sulphate of iron, one-half dram gentian root. For local treatment irrigate the vagina with one-half teaspoonful sulphate of zinc in a quart of warm water, and alternate each other day with a hot water douche at a temperature of 105 degrees. As soon as the tonic has put the mare in good condition, and this may be two weeks or it may be two months, instead of the tonic give twice daily in water, from one to two drams of fluid extract of *Mitchella Repens*. I have been using this specific for barren mares, and those troubled with catarrh and leucorrhœa for eleven years with uniformly good re-

sults. The sulphate of zinc is one of the best stimulants for mucous membranes we have. It is used by oculists in almost every preparation known for granulated or inflamed lids. Mares breed readily after this, if there is no trouble but those indicated. The fluid extract of *Mitchella Repens* I have never known to be used in treating horses, or mares, until used by myself. With good hygiene, good nursing, and treatment as directed, I have made producers of many mares given up as barren by others.

Abortion in mares is the last disease to be mentioned in this chapter. This disease, so costly to breeders, can be divided into those that are contagious or infectious and those that are accidental. Abortion is the expulsion of the impregnated ovum at any period from the date of conception until the foal can survive out of the uterus. Accidental abortion may be brought about by reason of anything that very profoundly disturbs the system. Violent inflammations of any important internal organ, acute indigestion, diarrhea, the presence of stone in the bladder, uterus or kidneys, may so disorder the uterus as to induce abortion. Service by the stallion, blows on the abdomen, rapid driving or riding, over pulling on heavy loads, backing loads, rough handling or the use of the whip, shipping, jumping, slipping, falls, working in deep mud or snow are all well known causes of abortion. It will be noticed, however, that most abortions occur just after cold rains and sudden changes of weather from warm to cold. About eighty per cent of all abortions occur at such times. Irritant medicines, the ergot of rye or other grasses, the smut of corn and other grain,

and various fungi in musty hay are other causes. Frosted food, indigestible food, green food in a frozen state, and filthy, stagnant water are all dangerous to use for pregnant mares. In addition to all these one must not lose sight of the diseased condition of the foetus, or its membranes, entailed by a sire of low vitality, whether caused by too frequent service, or a want of proper exercise.

The symptoms vary according as abortion is early or late in pregnancy. During the first two months, and by the largest number of abortions occur at this time, the mare may abort without observable symptoms, and the fact is made known, only by her again coming in heat. If closely observed a small clot of blood may be found, in which the embryo will be revealed. If the occurrence is later in gestation, there is likely to be some general disturbance, when the small body of the foetus will be expelled, enveloped in its membranes. Abortions during the last stages of pregnancy are attended with greater constitutional disturbance, the process closely resembling normal parturition. There is the swelling of the vulva, with mucous or even bloody discharge, the abdomen droops, the flanks fall in, the udder fills, and the first pains of parturition begin. Abortion may be followed by the same accidents as normal parturition, such as malpresentations, flooding and retention of the placenta.

Treatment should be preventive as much as possible, to the extent of avoiding all causes of constipation, diarrhea, indigestion, unnecessary medicines, painful operations, and abuses of all kinds. When abortion is threatened, the mare should be placed by herself and

given one-half ounce of fluid extract of black haw, three times daily. The best veterinarians now regard this as the most active preventive of abortion known. Carbolic acid is also employed in the proportion of one dram to a half pint of water. If the mare strains, leading her around for a time will sometimes stop it, but if it does not, this should be checked by some sedative. One ounce of laudanum in two ounces of water may be given every three hours until straining has ceased.

If all measures fail and abortion proceeds, all that can be done is to see that both foetus and membranes are removed. After abortion, good care should be given the mare, in the way of exercise, pure air and wholesome food. No mare should be bred sooner than three months after an abortion, and some mares never conceive after one abortion. If a mare is bred and conceives, she should be treated for abortion before the next abortion is imminent. This can be done best by giving the black haw as suggested, about one month earlier in the gestation than at which she aborted the preceding year.

Contagious Abortion is not likely to be present in mares as in other domestic animals. It is only in low, undrained localities that I have found trouble of this nature among mares. It never occurs in high altitudes, and very rarely in high land localities of lower levels. No disease is more difficult of diagnosis, since we find mares in the same herd manifesting many symptoms. In most cases the mare appears sluggish, listless, even stupid. Occasionally the opposite is indicated, the mare acting restless and nervous. A temperature of

one or two degrees above normal is the rule for a day or so before the foetus is expelled. The cause of the disease is a germ or bacillus shown in figure 43.

These bacilli were present in all of seventeen cases of abortion in one herd. Not a mare in this herd escaped. The microbes were found in the excrement of geldings and young mares running in this herd, yet

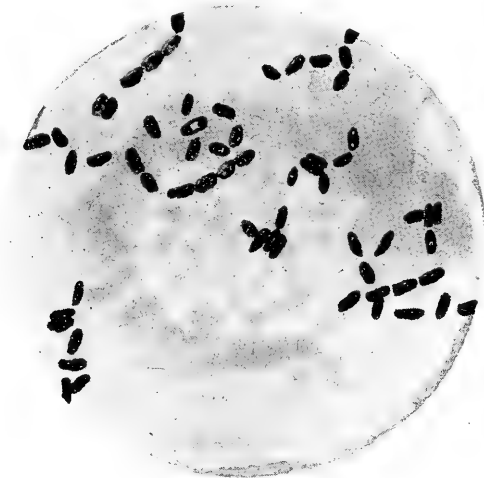


Figure 43. Germ of contagious abortion in mares. (1000 diameters.)

all animals incapable of producing foals were normal in every way. They were found in the excrement and blood of all mares aborting. Every foetus expelled was found to contain them in all parts.

Blood serum cultures were injected into pregnant sows and cats with no evil results, but a five year old

in-foal mare inoculated with pure cultures aborted eleven days later. I found that the cultures multiplied most rapidly at a temperature of forty to fifty degrees F. This will account for the prevalence of the disease late in the autumn.

Since these germs are found only in low lands, it can not well be said they are associated with filthy conditions and surroundings. Mares running in low pastures, but having no access to yards of any kind, or to filthy places are as likely to contract the trouble, as those having access to filthy yards and stables.

The disease is highly infectious, as is evidenced by every mare in a herd aborting, and the stallion is quite likely to be the source of infection. No stallion should ever be mated with a mare known to have aborted. Such mares should be bred by the capsule method. Mares will carry the infection from year to year and for many years. Because of this mares aborting from this cause should be thoroughly disinfected before being rebred. Every foetus of this character should be destroyed by burning, and mares aborting should be removed from all other in-foal mares.

CHAPTER XI.

THE BREEDS.

The history of the several breeds of horses has been written by men well qualified to discuss that subject from every viewpoint. The agricultural and live stock press of the country has at many times reviewed these works, bringing out the more essential features in such a manner that the public generally, has a very fair knowledge of this subject. For business reasons, the press above referred to, has been silent, concerning a few of the things, which the breeders of the country have been wanting to know. Because of this delinquency upon the part of our live stock press, I will give a brief description of the chief characteristics of the more important breeds. This will be done only from the viewpoint of the breeder. No attempt will be made to write or regard it in any manner as a history. To do this in a manner worthy of the subject, would require the space of a large volume. Only the briefest mention of the breeds from the viewpoint of today will be made.

The first division of the horse into breeds or classes, is into the draft horse, and those to do the lighter and more speedy work of man. Into the horse of great motive power, and those of greater action. Of the



Figure 44. An imported 3 year old Belgian stallion.

former class we now have five breeds, Belgian, Clydesdale, Percheron, Shire, and Suffolk. For the purpose of this chapter the latter class can be subdivided into four subclasses, the heavy harness or park horse, furnished by the Hackney and Coach breeds; the light harness horse of which the Standard and modern Morgan are best representatives; the five-gaited saddle horse and the Thoroughbred or running horse. The latter is the basis of all good blood in all the light classes.

Where Draft Horses Are Grown. To speak intelligently, or to have a correct understanding of the merits of a breed of horses, one must know something of the country in which they were grown. We should also know something of the people originating them. A horse that would be a good one in one part of the world might possess but little value in any other location. The conditions of soil, water and climate are mighty factors in the making of any breed of horses or even of man himself. Few people have ever given this thought the attention it merits. Those who are trying to grow large draft horses upon their impoverished soils are doomed to disappointment. All the famous draft horses have had their origin upon the best of soils, soils rich in lime, potash and phosphorus; that is on soils rich in bone material. One finds them growing upon rich lands always, and that the size of the breed is determined by the capacity of the soil to grow an abundance of rich, nutritious food. Small horses can be grown almost anywhere, but the big drafter requires big feed, and this in turn rich soils to grow it. The future may modify this some-



Figure 45. An imported 4 year old Shire stallion.

what, by taking the feed grown upon rich soils in one locality, and shipping to localities of less feed and thinner soils. The future home of the big horse, will not be one of altitude, but wholly one capable of producing the feed. Another factor entering into the discussion of breeds, is that of differing opinions as to correct standards. Scarcely any two peoples, or even men, can be found agreeing upon a common standard. Even judges differ, and when they differ there is mighty little chance for ordinary breeders to agree. Men also have different motives for doing things, money having a greater influence upon the people of some nations than it has upon the acts of others.

The Belgian. The breeders of the very small territory making up the monarchy of Belgium, have been peculiarly situated for the growing of big horses, and yet they have succeeded in growing a horse capable of carrying more weight, than any horse in the world. Because of their small and cramped situation everything has been sacrificed to the moving of heavy loads at a minimum of cost. In muscular development he excels over all breeds. His compact form, with low flank line and great depth of body, are evidence of his being a good feeder and easy keeper. His constitution and digestion are good. Because of this, coupled with his great capacity for carrying his feed, makes him one of the very best shippers. He also adapts himself easily to change of climate. In fecundity and longevity the Belgians are about the average of the draft breeds.

In the early development of the breed, little attention was given to either conformation or soundness.



Figure 46. An Imported French Coach Stallion.

Because of this early neglect, he is yet not as prepotent in the reproduction of the most desirable types as some of the other breeds. Although much improvement is noticed of late, he is still too short and straight in the pastern, and also too full in the hock. Many specimens are rather short in the neck, low in the back and short in the croup. Much has been said by his admirers in favor of his intelligence and docility, but I have found him neither as good in disposition nor as intelligent as some of the other breeds. His brain capacity is very small. This is indicated by the shortness of head from eye to ear. The Belgian is found in all the colors, bay, roan and chestnut being the colors most frequently seen.

The following circular will explain itself. I believe it to be the first attempt ever made by anyone to collect data to aid in adopting a standard for draft horses from the utility point of view. At the same time it shows the tendency of breeds to become unsound in certain directions, when put to hard work upon the streets of our cities.

“Knowing your business calls for the use of a large number of horses, I feel you should be no less interested than the breeder in the best it is possible to produce. The fact has probably been forced upon you before now, that some horses have as much service in them as two or three others apparently as good. As an aid in producing better horses, will you kindly fill and return to me the blank form below.

“How many horses have you in service at this time?

“From the standpoint of dominant blood, to what breeds do they belong? Give number of each.



Figure 47. The Hackney mare, Queen of Diamonds, imported and owned by Truman's Pioneer Stud Farm. One of the best Hackney mares in the United States today, having won honors at all the leading horse shows of the country. Note the extreme beauty and symmetry of this mare in all her parts.

“How many are unsound in front? with side-bone, ring bone, navicular lameness, shoulder or foot trouble?”

“In each case of unsoundness or lameness in front, give description of pasterns, as to length and angle.

“How many are unsound behind, with hock, fetlock or pastern lameness?”

“Are any unsound or lame from any hip trouble?”

“In each case give the particular trouble and the breed to which the horse belongs.”

The above circular has for many years been mailed to those firms using large numbers of horses, ranging in size from 1,400 to 2,000 pounds. These firms were located all the way from Bangor, Maine, on the east, to Portland, Oregon, on the west. In all an ownership of 101,839 horses have been reported. This includes some Canadian owned horses. The following table shows how the breeds stand as to soundness.

Breed	No. Horses Reported	No. Becoming Unsound	Per Cent of Unsound
Belgian	1499	511	34
Clydesdale . . .	21382	2992	14
Percheron . . .	59160	26028	44
Shire	19798	3371	17
Totals	101839	32902	32

In some instances horses were reported as Normans or French draft. These are included in the Percheron list. Of the 101,839 horses reported, 32,902 were reported as unsound. This makes a very bad showing, and emphasizes the need of better standards and better sires. The Belgians were reported in smaller numbers than any other breed. This in part is due to many grade Belgians passing as grade Percherons. A little



Figure 48. The Standard bred stallion, Pat Bourbon, No. 41157, owned by P. H. Parker, Plainview, Neb. This stallion is an excellent type of the light harness horse.

less than one-third, 32 per cent, were reported unsound, nor was all horses unsound reported as such. I found it the rule in most barns to report as unsound only those incapacitated for full work. The Belgians were unsound chiefly, because of defective hocks and pasterns.

The Clydesdale. In Scotland we find the home of the Clydesdale. In his early history he was very much like the Shire, both having a common origin. In the production of the modern Clydesdale, more science has been employed than in the production of any other draft horse. To such an extent is this true, that scientifically speaking, he is the world's best product in draft horses. When viewed from the standpoint of a perfectly and scientifically constructed machine, built to perform its work with the greatest ease and least friction, he has no equal. His sloping shoulder and elastic pastern, his short back but long underline, and his well nigh perfect hock, cause him to do his work with so little friction and concussion resulting, that his legs seldom go wrong. The world's best breeders regardless of their favorite breed, concede to the Clydesdale the most perfect action at the walk. I have seen in the large cities of Scotland, geldings still fresh in their legs after working for ten or more years upon the streets.

The sloping pastern is occasionally being overdone, and to improve the quality, some of the ruggedness of the early Clydesdales is being lost. With all his good qualities; with his nearly perfect conformation, he is not generally popular in this country, and will not be unless the Scotch breeder will make a few conces-

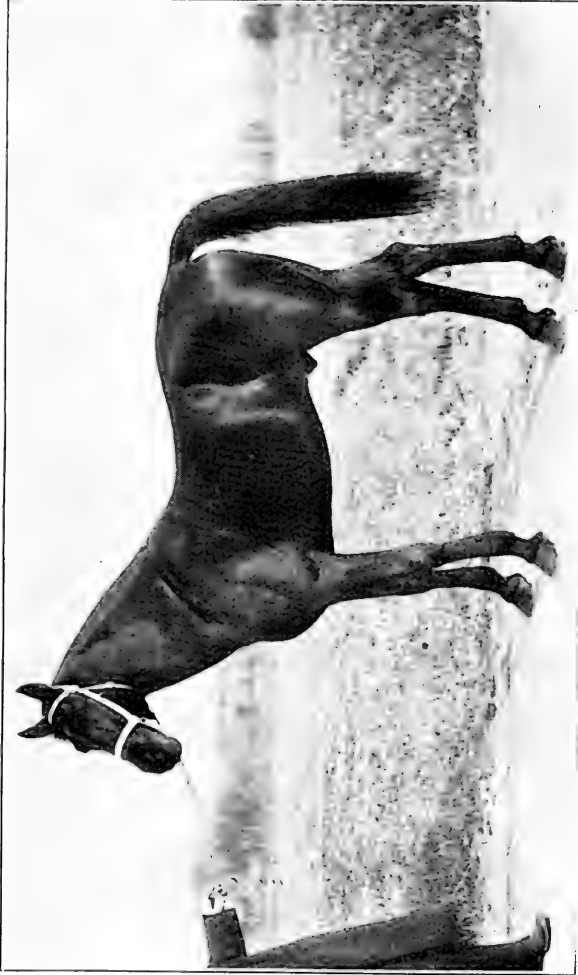


Figure 49. The Standard bred stallion, Malaver, No. 31739. Sire, Allerton; dam, Pattie P., by Petosky, by Geo. Wilkes; 2d dam, by Homer, by Membrino Patchen; 3d dam, Lulu Parrish, by Almore, by Almont. This stallion is pure gaited, and a good actor. He is the sire of many high-class actors, and all of his get are pure gaited like himself. Property of R. G. Hynicka, Lebanon, Pa.

sions to win the trade of the breeders of the United States. I say, concessions, for they are such when viewed from the angle of the Scotchman.

The Clydesdale is too nervous, too unbalanced in the head to please most Americans. He is also cut up in the flank to such an extent that he is usually a poor feeder. Then his color is much against him in this country. The people of the middle and western states do not take kindly to any but a whole colored horse. Horses with white legs and faces, and occasionally white spots on the body can not be made popular in this country, but when all is said there is more promise for the Clydesdale of the future, than has been known in the past. The Clydesdale breeding associations, both in this country and Scotland have much to be hopeful for. There is no suspicion of wrong doing by the associations or any member thereof, and there is a visible effort on the part of all interested to keep the Clydesdale up to a high standard of excellence. The geldings of this breed are becoming more popular every year, and they justly merit this popularity, for their wearing qualities are of the best. In size they are smaller than the Shire, and larger than the average of Percherons. They have plenty of bone of good quality, with their legs well set under them. In fecundity they are about the average of the other draft breeds.

The Percheron. The Percheron is found in all the colors known to draft horses, black and grey predominating. He is found in this country in larger numbers than all other draft breeds combined, quite conclusive evidence of his popularity. In intelligence the Percheron has no equal among draft horses. He

has also an abundance of nervous energy, making him an agreeable horse to work and handle. This has been the chief factor in gaining for him his great popularity in this country. The American has little time to waste upon dull or stupid horses, and he likes a horse capable of making the round trip in a day. In motion the Percheron appears best at the trot, some individuals of the breed showing considerable speed for horses so large. He is often found too short in the pastern and too straight in the shoulder to appear well at the walk, and some have a way of going too wide behind, to move with greatest ease and without friction. They are about the average of the other breeds in fecundity, and perhaps slightly longer lived than some others. Their smooth legs are generally found free of those sores, such as trouble those breeds with more hairy legs. More fancy geldings have been found with Percheron blood dominant than of any other. This is especially true when there is a dash of British blood present to increase the bone.

The worst defect of the Percheron as a true drafter, is found in the large number of small individuals, and the tendency to small bone. This is even noticeable in many of the prize winning families. The want of more bone causes many of them to quickly become unsound in their hocks and fetlocks when made to do hard work. The table in this chapter upon that subject makes a sorry showing for the Percheron. Although many of them were yet young, out of 59,160 Percheron work horses, 44 per cent were already unsound. It is impossible to build a horse of 1800 pounds upon legs intended for a horse to weigh only 1200 pounds. Upon

this point the breeders of Percherons in this country have need to take notice, lest they be compelled to go outside the breed in the near future for new blood with which to build up a breed of real draft horses.

This condition of affairs has been brought about by what might well be called the politics of the Percheron industry. In founding the Percheron stud book of France (the work of Americans) the only horse of draft size and conformation in that country (the present Boulanais) was denied the privileges of that register. Besides the few in control of the registers in this country have influenced the industry, and all the horse shows of any considerable importance to such an extent, that little horses with small bone yet flashy appearance have been placed above many individuals of real merit. It is no pleasant task to be compelled to record such matters, but when dealers and importers will price blue ribbon winners \$500, below their other horses shown in the same class but winning no place, it is quite time for the true breeder to begin to do a little thinking upon his own account. I have spent much time in tracing high class geldings back from the market where they would sell from \$350 to \$500 each, to the place where they had been sired by stallions unknown beyond their immediate locality, but always stallions of great draft merit. One of the conditions which ought to cause our judges of draft horses to do a little careful observing and thinking is, no where in this country can any of the best known show stallions in the Percheron breed be found producers of high class ton geldings. The echo for more and more high class geldings of a ton to 2,200 pounds

weight, is heard rolling over the continent from Boston to San Francisco. One may attend sale after sale and the Percheron mares offered, will for the most part run from 1,500 to 1,700 pounds, and with scarcely enough bone for that weight. The importer is flooding the country with a small, light boned stallion, with not enough size in some instances to draw an express wagon. With such a condition confronting us, where are these ton geldings to come from? There is but one answer, from the other breeds. The Percheron importer has never shown any interest in the American breeder, further than to relieve him of his surplus cash. He has yet to show any civic pride in the way of bettering, either the Percheron industry or the general welfare of his country. His supreme effort in gaining and keeping control of the industry, coupled with his remarkable greed for money, will yet be the means of putting the Percheron horse out of commission. When viewed from the standpoint of the drafter, little if any improvement has been made during the past twenty-five years. A larger per cent of good draft specimens were found among the early importations of the breed into this country, than are found among those coming now.

Another force which is working much injury to the Percheron industry in this country, is that of dishonesty and graft. Go where one may throughout the breeding districts of this country, and he will hear the same mutterings, the same expressions of a desire to have a change for the better. All this noise and smoke is not for nothing. It means more than most of us are willing to admit. Nor is all this dishonesty upon this side of the Atlantic. No where in all the world



Figure 50. A Five Gaited Saddle Stallion. Pea Fowl, No. 2768. Owned by J. W. Pugh, Woodburn, Ky.

can dealers in breeding horses be found with a more undeveloped sense of honor, than in France. With a large majority of these French dealers, a certificate of breeding means nothing but a convenience in making a sale. To them a pedigree is but a joke. Over there certificates of breeding are things to be juggled with, to please mens' fancies. Nivernais stallions are sent to this country with Percheron certificates. The certificate of one horse is sent with another. One of the prize winning mares at the 1909 shows has been sold to two Americans, but the mare is still in France. Another winning third place at one of the leading shows of France has been sold to four Americans, and still the mare remains in France. At least her certificate was in the hands of her original owner on March 1, 1910. This would be regarded as pretty good evidence that the mare is not far away. When all these things are known, it is enough to force a smile from an intelligent man, when he hears people talking about the breeding of an imported Percheron.

These things are not written to help some other breed, for it is well to know that the writer is breeding Percherons only. Nor is it written to injure any one or any industry. I am many times each month asked concerning these things, besides receiving letters from all parts of the country weekly, containing questions upon this subject. I take it that the people have a right to know the truth. At considerable expense to myself I have gathered much evidence of value to breeders of this great breed, only a hint as it were, being given in this chapter. When all has been said, the same forces will be found at work in France, that one

finds here. It is the dealer in both countries, rather than the breeder, that is doing this irregular work. There are a few breeding establishments in France presided over by men of the strictest integrity. There are



Figure 51. A pair of Shelties.

thousands of breeders in the United States, than whom no men living possess a higher or truer sense of honor and it is to these, rather than the dealer that the future of every breeding industry in this country must be entrusted.

The Shire. In size and bone, actual measurement, the Shire is the largest of all breeds. He has done more than any horse or breed of horses in this country, in

the production of rugged horses with plenty of bone. Many of the high priced geldings produced in this country, although accredited to some of the other breeds, owe their great size and abundance of bone to the blood of this breed. When mated with small mares, especially mares of very small bone, he will produce a larger, more rugged foal than any other sire. However, his bone is slightly coarser, and he has more hair upon the legs than any other breed, an objection from the view point of this country which can not be overcome. His disposition is good, yet somewhat headstrong or selfwilled. In the language of the Englishman, "He has a good deal of powder in his eye." His walk is excellent, both as to speed and the way of going. As a work horse he is among the best, always giving evidence of his great power when put to the test.

The Shire does not endure long shipping as well as some breeds, and rarely does as well in this country the first year after his arrival here from his native land, as in the years to follow. We learned in chapter VII, that the Shire is not as fecund as the other breeds. This I regard as the fault of the English breeder, rather than of the breed itself. The English man does not take kindly to masculinity in a stallion. This has caused him to select the more feminine type of Shires for his breeding stallions. Continuing this practice for many generations has resulted in fixing a type of stallions very deficient in masculinity. He is very deficient in muscle at the fore arm, gaskin, and upon the shoulder. The Shire stallion has not been worked in his native land for many generations, and he is becoming more deficient in muscle every generation. The American bred

Shire is a better horse in respect of this, as he is given more pasture to grow in, besides being worked more here than in England. The Shire bred in this country has much less hair upon the legs, than those imported. This is especially true of those bred in the west at high altitudes. I know of one herd in Wyoming, all their ancestors being English bred, yet these horses are quite free of hair the second generation from imported stock. At the same time they have increased in size and muscular development. The color of the Shire does not differ from that of the Clydesdale, bay and brown, badly marked with white being the colors most frequently seen.

The Suffolk. This breed is found in this country in smaller numbers than any other. His native land is Eastern England. His color is always a shade of chestnut and in transmitting his color he is very prepotent. In longevity they have no equal, and in fecundity they excel over all the breeds. I have seen mares of this breed in England that were regular breeders, when well up into the twenties. I notice the same is true of them in this country. I doubt if a mare of this breed ever reaches an age when she is not a regular breeder. I have never known a stallion of this breed being sterile in the least degree. The Suffolk is the most docile of all the breeds, yet not as intelligent as he might be. A tendency to wildness or nervousness is never observed within the breed. In quality of bone they are slightly better than the other draft breeds. In conformation they have the straightest croup and best top line of all the draft breeds. They are good feeders, with a deep body, and endure shipping and hard work, the equal of

any horse in the world. A tendency to thickness or fullness of the hock is noticeable in some of them. He has the least hair upon the legs of any draft horse known, differing from the other British breeds in this respect. Many individuals of this breed are below the size now wanted for draft purposes. This is their worst defect as a true drafter.

A Comparative test of bone of the five breeds of draft horses, in comparison with the bone of a thoroughbred stallion, one that had made good, both upon the race track and in the stud, makes an interesting study. The bone of this stallion in fineness of texture would compare very favorably with ivory. Excepting one mare in the Suffolk class, the tests were made with the bones of stallions, and all were imported. The bone of this mare did not differ from that of the stallion of her breed. Only two animals were used in the Suffolk class, while many were used in all the others, the averages being used in this table. The same sized horses were used, all weighing close to the ton mark, excepting the Suffolks which were slightly smaller. I found the same ratio existed in all the breeds between the pressure and gravity tests, so only comparative weights will be used here, that of the thoroughbred being given as one hundred, the basis of the test.

A cubic inch of bone from the Belgians weighed 62.6 per cent as much as that of the Thoroughbreds. The Clydesdales 61.2; the Percherons 63.3; the Shire 57.9 and the Suffolks 68.7. The above table teaches us that in the quality of bone, but little difference is found between Belgian, Clydesdale, and Percheron, while the Shire is some below the others and the Suffolks consid-

crably above. The Suffolks had a slight advantage in the test, in being slightly smaller than the others.

The distinguishing marks or traits of the several draft breeds is of interest to many. The greatest interest is shown in being able to always classify Belgians, Percherons and the two most numerous British breeds, Clydesdales and Shires. While the Belgians have a few minor characteristics not usually found in the other breeds, the thing by which he can always be known is the head. No other breed ever has a Belgian head. The shortness of head and ear, the latter coming out of the side of the head, the shortness of space from eye to ear and want of fullness at this point, are all marks belonging to the Belgian only. If one will take a good look at figures 44, 64, and 65, he will see nothing if not Belgian character.

The Percheron has much about him that can not be found in any other breed. In the first place he has a head that can not be found in any other draft breed. In the width between the eyes, and the distance from eye to ear one finds something truly remarkable. The space between the eyes and ears of the Percheron is always full and prominent. In other words he has a larger brain space or cavity than any other. The crest of the Percheron is unlike that of any other breed, in being better defined and more masculine. In the muscular development of shoulder, fore arm and gaskin, the Percheron is found at the other extreme, when compared with the Shire. The Percheron is always muscular, while the Shire is deficient in muscle. In his nervous energy and way of going, the Percheron shows more blood than any other draft horse. The hair upon the legs will be discussed later.

The Shire and Clydesdale will for the purpose of this description be regarded as one breed. So far as breed character goes, the Shire is almost the opposite of the Percheron, and this subject is now being discussed with reference to stallions only. The Shire has little or no crest, many of the stallions having every appearance of a gelding, and that muscular development of shoulder, fore arm and gaskin already referred to is wanting. Herein lies the distinguishing difference between the Percheron and Shire. We are now assuming the color to be the same, for one can find bays with strip and four white pasterns in France. Regarding the hair upon the legs, it is not always safe to assume that every horse with hairy legs is of Shire origin. Many Percherons of the old Boulonais type wear as much hair upon the legs as many individuals in the Shire breed. As a rule the Percheron is quite free from long hair upon the legs, while the Shires are famous for this one thing. For all this, some of the best Percheron stallions ever brought to this country from France were as hairy at the legs as many Shires, and it is a well established fact that the best and heaviest geldings ever sired by Percheron stallions, were sired by these great big Percherons with much long hair upon the legs. Upon the other hand there are quite a few Shires coming to this country from England with very little hair upon the legs. This is not the type popular in England, yet they are there just the same. I emphasize this point, only because there are a few misinformed men who believe all Percherons have the legs of a Thoroughbred, while all horses wearing long hair at the legs must be of British origin. When we speak of draft horses, the

best Percheron breeding establishments upon this continent will invariably be found with horses wearing long hair at the legs, and the more hair one finds there, the more bone, the more substance and the more size will he also find in the horses there. So far as hair upon the legs is concerned, one should look a little higher up. If the fore arm and gaskin is deficient in muscle, I would feel safe in classing the horse as a Shire. However long the hair might be, if the stallion had a well defined crest, coupled with a good muscular development and the other Percheron characteristics, I would not hesitate to class him with that breed. There are others who are inclined to classify every horse with an arched nose, or great fullness below the eyes, with the British breeds. Again many Percherons are found with similar heads, and again one usually finds them among the stallions producing large horses. Such a head, when narrow between the eyes is likely to be a Shire, but when wide between the eyes it is more likely to be a Percheron. My own observations extending over many years, make it possible for me to sum up the whole matter in one sentence. The more a Percheron resembles a Shire, the more certain he will be of siring ton geldings.

The heavy harness or park horse. This class is made up or filled so far as market requirements are concerned by the Hackney more than by all other breeds together. The Hackney is a native of England, and possesses more blood than any other horse of Europe used for harness purposes. The conformation of the Hackney is more nearly correct for high action than that of any other horse. The well nigh perfect flexing

of knee and hock of the best actors within this breed is a beautiful sight, yet he is nothing if not a rich man's horse. Bay, brown, chestnut and black are the principle colors of this breed.

The coach breeds, so-called, both French and German, are sometimes bred in this country for the purpose of supplying the demand for heavy harness horses. Few can show the action required for this purpose. These breeds were produced to be used for military purposes in their native countries, and have been introduced into this country as the result of the American commercial spirit. I have spent both time and money investigating this subject but have yet to learn of a district in the United States that has been benefited by the Coach horse of either country. The French coach carries the more blood, and is the more uniform breeder. Most of the get of Coach stallions reach the markets of the country as some kind of a misfit, without the size and weight to perform the heavy work of the country, and with insufficient action for high class heavy harness horses.

The light harness horse. This class comes principally from the Standard bred trotter, a breed of American origin. This horse is too well known to need more than a mention. Some excellent specimens are to be found within this breed for light harness driving, being both intelligent and speedy. It is the larger specimens of the breed that are used for this purpose.

Recently the federal government has shown an interest in the light horse industry, and are aiding by a breeding experiment, blending the blood of the nearly extinct Morgan family with that of the better types of Standard blood.

The Five Gaited Horse. This horse is a product of the rough part of the southern states where the saddle horse was a necessity, and much intelligence has been used in his development. He is the result of crossing Standard bred pacing mares with Thoroughbred Stallions, and demonstrates what can be done by cross breeding when intelligently done. He is strictly an American product and he has come to stay. For the breeder who has a fancy for a warm bred horse, and is capable of developing him to the highest limit, the Five Gaited horse offers a lucrative field. He will always be in demand in our own large cities, as well as in his native southland.

The Thoroughbred. This horse, the origin of all blood and speed, needs no mention in this work. His part in the world's work has been recorded in poetry and in fiction, as well as in history.

The Shetland Pony. This is a member of the equine family worthy of brief mention, as few are more profitable to breed than the Shetland. The demand in this country is now greater than the supply. The cost of producing a Shetland pony is but little more than for a large sheep. Well broken, he sells readily for \$100 to \$200 in all the large cities of this country. He is a native of the Shetland Islands, to the north of Scotland. In earlier times he was used principally in coal mines and to some extent by fisherman along the coast. His food was always of the poorest and scantiest supply. The climate was of the fiercest for either man or beast, being both cold and wet. He has survived these things and will live under every known condition of climate or food. In this country he meets a new con-

dition, both as to his needs and his work. In a country where food is plenty he is always fat, while his only work in this country has been the companionship of children.

Some trouble has been experienced in this country in breeding them. This is wholly the result of too much feed. They soon become too fat to breed well, unless used more than is usually the practice. Most of the Shetlands brought to this country are bred in the north of Scotland.

CHAPTER XII.

JACKS AND JENNETS.

The mule breeding industry of the United States has grown to be a very important business, in many parts of the country. This has made the breeding of good jacks a very lucrative industry. For the truly good ones, the demand is larger than the supply. The best mules produced in this country, are sired by Mammoth jacks, a breed of American origin. While all the blood lines of the Mammoth jacks and jennets can be traced back to an European source, yet in their present state of perfection, they are strictly the product of American skill and intelligence.

The Mammoth jack is the result of the blending of the blood of jacks from Malta, Catalonia and Majorca. The name is borrowed from imported Royal Mammoth, a jack regarded by the best breeders of this country, to be the best specimen ever brought here from Europe.

A continuous effort has been made, and a fairly united one, by all the breeders in fixing the color to black, with light shading around the nose and upon the under side of the body. At the present time only occasionally does one revert back to blue or other off color.

In figure 52 can be seen a group of jennets and their



Figure 52. A group of jennets and their jack colts. Property of W. H. Brown, Clarks-ville, Mo.

jack colts owned by W. H. Brown, of Calumet Valley Stock Farm, Clarksville, Mo. The one marked No. 1, is Queen of Scots, No. 529. She won first in yearling class at St. Louis Exposition in 1904. Also sweepstakes as best jennet any age at Missouri State Fair in 1909. Fannie Pitman No. 391, is marked with a 2. Mohawk Queen, No. 525, is marked with a 3.

Figure 53 is that of the four-year-old Mammoth jack, Eagle, No. 3797, one of the truly good jacks of the country. This jack is owned by W. C. Martin, Pleasant Hill, Mo. Note the extreme vitality of this jack, as indicated by the large heart girth, as well as thickness of shoulders.

Crossing the jennet with a stallion, produces a hinny. This cross is now a common one in many parts of the southwestern states. The hinny is so like the mule, that only a few men can tell the one from the other. They are usually small, being used in the coal mines and for light delivery work.

The demand for mules combining size and constitution is a growing one. Formerly the so-called quality mule, was the one in greatest demand. This mule was rather tall for its size, with considerable energy and action, but rather deficient in constitution. It was the produce of a mare possessing much warm blood. At the present time quality means size, plenty of bone, large heart girth, with every evidence of good constitution, more than at any time in the past. Such a mule can be produced, only by the use of some draft blood in the mare.



Figure 53. The Mammoth iack. Eagle, No. 3797. Property of W. C. Martin, Pleasant Hill, Mo.

CHAPTER XIII.

CROSS BREEDING.

During the past two years, as many inquiries have reached me upon the subject of cross breeding as any other. Some are not very explicit as to what they wish to know, but I take it that most of them are interested in crossing very small mares with large stallions. The consensus of opinion is adverse to this, but it is either based upon a want of experience, or else the experience was with coarse, unbalanced stallions, wanting in quality. I mated a large number of small mares, weighing from 800 to 900 hundred pounds, for five consecutive seasons, with an imported Percheron stallion, weighing from 1950 to 2100 pounds, according to conditions of flesh. The result was a uniform lot of well balanced foals, maturing into marketable horses with an average weight of 1350 pounds. There was not a badly proportioned horse in the lot. This stallion was evenly balanced and well proportioned, possessing quality in a high degree. The breeding was all done by the use of capsules.

Mating Ponies with Stallions. For the sake of the experiment I have mated Indian pony mares weighing only 535 and 545 pounds with the stallion above referred to, and the resulting foals were good. They developed

into 1100 pound horses, well balanced and well proportioned.

Mating Small Mares With a Belgian Stallion. In the extreme western part of Nebraska, there is one ranch where a large number of 900 pound mares have been mated for five years with an imported Belgian stallion, weighing around 2200 pounds, the capsule system being employed in making the service. This spring two car loads of these horses (four years old) were shipped to Pennsylvania and sold at an average of \$212.50 each. The average weight of these four year old colts when loaded, was 1430 pounds each, and every one a good one, well balanced and well proportioned.

Coarse unbalanced Stallions do not mate well with any mare. A score of such crosses which have proved successful, when quality stallions are used, can be named for every one that has been a failure. It can be readily understood, that a stallion wanting in quality, coarse and unbalanced, would not cross well with any mare, however large she may be. Even when such stallions are mated with large mares, if observed critically, the foals will be found wanting in quality and balance, quite as much as those out of the small mares.

The breeds differ in regard to such crosses. As regards the crossing of small mares with large stallions, it makes some difference about the breed to which the stallion belongs. The British breeds do not give as good results in violent crossing, as do the Belgian and Percheron stallions. I have frequently seen horses with large heads and legs, but bodies small, resulting from mating very small mares with stallions of British breeding.

Crossing the breeds or mixing the blood of pure bred horses is quite another thing, and should never be undertaken by any but the most intelligent breeders. That this can be done advantageously, we already have proof. In crossing blood, it matters not so much about the breeds as it does the types. Mating animals of two breeds, but of the same general type, will give better results than mating two animals of the same breed, but of widely different types. To put it in another way, mating two animals of two draft breeds will give better results than mating two animals, one a drafter, the other belonging to the harness breeds.

The Saddle Horse is an illustration of this thought. It was produced by mating Standard mares with pacing gait, with Thoroughbred stallions. To begin with these breeds were of a similar type, and the cross resulted in a most pronounced improvement, for the purpose for which the cross bred product was intended. The gaits have been secured from the original mares from which the breed originated, while the symmetry, style of carriage and intelligence have been transmitted from the Thoroughbred.

Recrossing Breeds. The stallion shown in figure 54, is the result of a breeding experiment with draft blood. This experiment began with a grey imported Shire mare. She was mated with a black imported Belgian stallion, resulting in a grey filly. When this filly was old enough she was mated with a grey imported Percheron stallion, resulting in the stallion shown in figure 54. It is claimed by most writers that sires produced by cross breeding will not prove prepotent breeders; that their foals will not be uniform as regards any



Figure 54. A re-cross bred stallion, possessing the blood of the Belgian, Percheron and Shire breeds.

quality; color, size, or form. The stallion above referred to is owned by a colony of Russians in South Dakota, and enjoys the distinction of having produced more geldings selling for three hundred dollars or more, than any stallion ever owned in that state. His get are remarkable for their uniformity of size, combined with quality, and 85 per cent of them are grey. The number of ton geldings sired by him, and out of mares weighing only 1500 to 1600 pounds, is simply remarkable.

Here we have a re-cross bred stallion, that is, one the result of twice crossing, and possessing the blood of three draft breeds. The individuals composing his immediate ancestry, were quite uniform, although belonging to three breeds. A wider difference in type could be found within any one of the three breeds, which again calls out the statement, that it is not so much a matter of breed, as it is of type.

The Percheron and Shire Cross. We have another illustration in the result of crossing breeds, in a stallion owned for eleven years at Randolph, Nebraska. This stallion was out of an imported Percheron mare, and sired by an imported Shire stallion, both dam and sire being good individuals, possessing great size, and the best draft conformation. The dam of this stallion was a dark grey in color, while the sire was a blue roan. More than 90 per cent of the get of this horse were blue roan or grey, and this one stallion made Randolph the first primary market in the United States, in the production of high class geldings. The geldings sired by this stallion mature to 2200 pounds, and have sold in the open markets of this country up to five hundred dollars each.

The Mares of this Cross are also Producers of High Class Foals. Nor has the good done the horse breeding industry at Randolph, by this stallion, ended in the production of these high class geldings. His mares are proving the best producers of geldings ever owned in that district. It is a fact admitted by all breeders of pure bred draft horses, that no pure bred mares can be found in that district, which can equal as producers of quality, these grade mares sired by that cross bred stallion.

Adhering to Type. These things are not written to encourage any one to embark in cross breeding horses, for not one in a thousand would succeed, if they undertook it. When we remember that all draft bred horses have a common origin, it is not very violent crossing when we cross any or all of them. The thing to guard against is in crossing types. It is because of this that so few succeed in breeding pure bred horses. Only a few men seem to understand that by using a stallion of one type for one cross, then one of distinctly another type for the succeeding cross, must necessarily result in failure, and this is what most of our breeders are doing. To succeed in breeding, one must have a standard or type in mind, and then breed to it. It will not matter so much about anything else, if the standard or type is strictly adhered to.

Violent Crossing has Proved a Failure. In crossing types I have never known of any good resulting, when carried beyond the first cross. In Missouri I know of several stallions standing for service, the stallions being the result of crossing pure bred draft stallions upon Standard mares. The get of such cross bred stallions

have very little value, seldom two being alike in any respect. It is such violent crossing that has given cross breeding its bad reputation.

Mendel's Law of Heredity is the best test of the good or ill effects of cross breeding. When the ancestry of two animals is known, their produce can be foretold by this law, to nearly a mathematical certainty. One could take a grey mare of one breed, whose type or conformation throughout all her past ancestry was the same as that of a grey stallion of another breed, and their produce would be just as certain to possess the grey color and conformation of the original pair, as if that pair had been of one breed. This one sentence covers the entire field of cross breeding.

CHAPTER XIV.

THE PHRENOLOGY OF THE HORSE.

To speak of the phrenology or mentality of the horse to some men is but to provoke a smile, yet these same men when questioned, are willing to admit that value in a horse represents something more than bone and muscle. Bone and muscle would be of little value, if there was no stimulation for the action of these parts. This stimulation is but the function of the brain, and is carried to every part and every muscle of the body, by means of the spinal cord and its many branches.

The Amount of Nervous Energy a horse possesses, will determine the ease with which he performs his work.

It will be noticed by any one at all observing, that no two horses perform their work with the same degree of exhaustion resulting. Some appear to do their work with a freedom and willingness unknown to others, and yet show no signs of exhaustion; while others must be urged in order to get them to do their work, and yet they always appear to be exhausted. This is wholly a condition of the nervous organization of the horse. Then again, some horses perform any task given them in an agreeable frame of mind, while

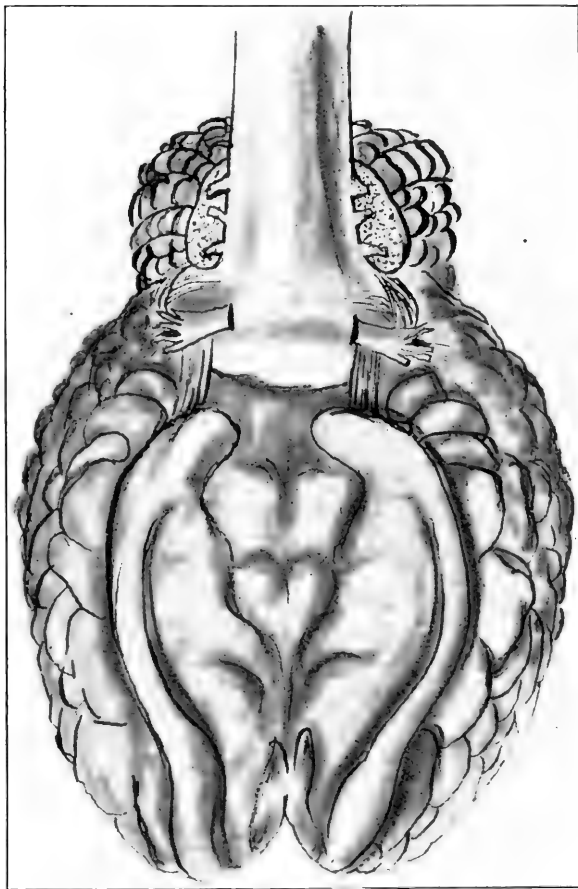


Figure 55. The brain of the horse.

others will do nothing except under protest. The one is a willing helper, the other surly and obstinate. In this particular they do not differ from the human subject.

A Study of the Comparative Anatomy of the brain, discloses the fact that in all the faculties of the base of the brain, there is little difference between man and many animals. Animals must eat as well as man, hence we find the faculty of appetite developed in both. Both must defend and protect themselves from all forms of injury and we find the faculties of combativeness, destruction and secretion common to both. The desire to mate, and the love of young are common to both man and the horse and we find these faculties developed in both. The organs of form and locality are needed by the horse as well as man, and we find these faculties developed in a high degree. The horse must have the organ of form, to aid him in seeing in the night, as well as to be able to see and distinguish between forms seen at any time. The organ of locality is just as necessary to him, that he may know and remember locations and directions. A horse never forgets a place he has once been to, and most horses if taken away from home for a long distance and by circuitous windings, will return by the shortest route, if given their liberty. I know of a Pawnee pony mare that was ridden from eastern Nebraska, southeasterly into and through Missouri, then in a northerly direction to near Davenport, Iowa, from the latter place she broke away from her keeper and made back directly to Nebraska, and her numerous family, reaching her old home three months after she was

stolen. She was traced over this route, but always enough behind the rider to prevent his capture. It was known that the pony had secured her freedom and was on the way back, two weeks before she reached home.

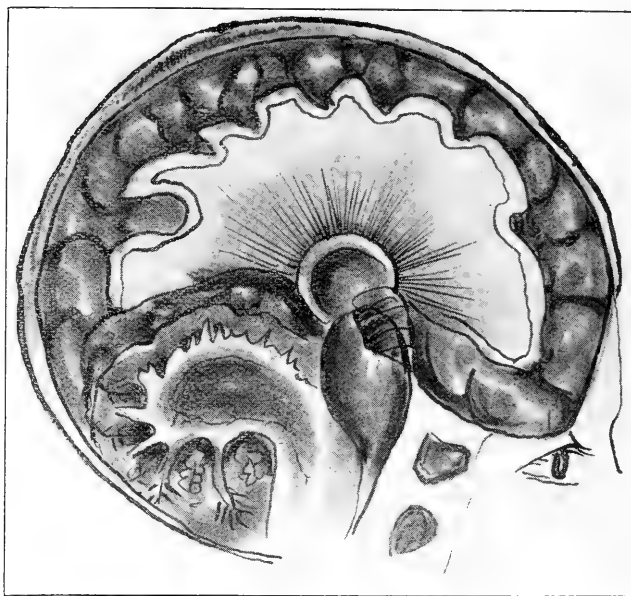


Figure 56. The human brain.

The Brain of the Horse is of better quality than that of any other animal.

While the brain of the horse is relatively smaller, than the brain of some other animals, yet in no other

animal can so fine a texture of brain be found. It is the texture or quality of the brain, quite as much as its size that denotes mental quality. Some horsemen have held that a horse must be very unintelligent, because of his small brain, while as a matter of fact few animals, if any, are capable of manifesting such rare intelligence as the horse. All other things being equal, size would be indicative of power, but throughout all Nature, quality counts for as much as size. A large timber of pine would be stronger than a small one, yet a small piece of good hickory may be stronger than either. An organic structure of high quality, indicates a like mental quality.

Quality of the Brain Texture is analogous to the temperaments, which are alike in man and the horse. The nervous temperament is of greatest interest to the horseman. It is the nervous temperament developed to a high degree, that gives the horse that quality we call stamina. This is but "bottom," or staying power. It is also the intelligent horse in which we find the nervous temperament predominating. Possessing this temperament should not be construed to mean a horse with excitable, or uncontrollable temper. It means the reverse. It means one having perfect control over both temper and actions. Breeds can be recognized quite readily by their temperament. The warm bred horses, such as the harness, and saddle horses are usually found with the nervous temperament predominating. The Percherons possess this temperament to a higher degree than any other of the draft breeds.

The Vital Temperament is found developed in the Belgian more than in any other breed. The vital tem-

perament supplies vitality to the organs. It is the source of all vital energy, and sustains the entire animal economy. Its predominance gives a horse with a deep well filled body, with a tendency to take on flesh rapidly. It is from among horses with this temperament well developed, that we find most of our dull, sluggish, and stupid horses.

The Motive Temperament. It is this temperament

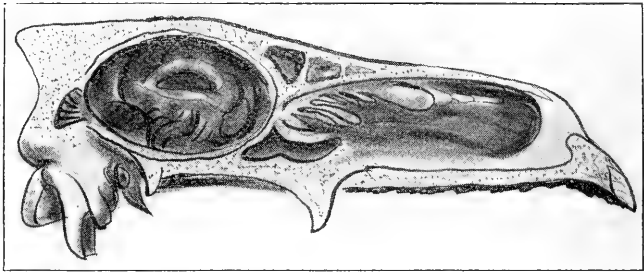


Figure 57. The skull of the horse, cut in half and showing the brain cavity.

that results from the organs of motion being well developed. This temperament is indicated by the development of the bones and muscles of the horse. This temperament is more prominent in the Shire than any other breed, while the Clydesdale combines the motive and nervous temperaments in a remarkable degree. We find most of our self willed horses among those with large motive, and small nervous temperament.

A Well Balanced Organism. It is possible to have the temperaments well balanced. So far as draft

horses are concerned, the better balance found existing between the temperament., the more valuable the horse. In the Belgian as a breed, we find the nervous

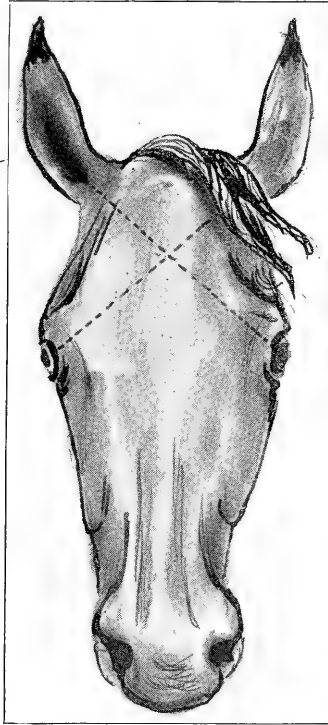


Figure 58. Front view of the head of an intelligent horse. Note the great width between the eyes, and the extreme distance from eye to ear.

temperament poorly developed. The Clydesdale is more deficient in the vital temperament than any other,

while the Percheron as a breed is found deficient mostly in the motive temperament. A well balanced organism can be found more often among the better Percherons, than in any other breed.

The Comparative Anatomy of the Brain of the horse can be studied by a comparison of figure 55, with that of 56. In figure 55 can be seen the brain of the horse, while figure 56 shows the human brain. The greatest evidence of brain power, is in the convolutions or folds of that organ. It will be noticed that these convolutions are as great in the case of the horse, as in that of man. The only difference being in the case of man we find many convolutions not present in the brain of the horse. This corresponds with the phrenology of the two subjects. The social, aspiring, moral and most of the intellectual faculties found in man, are wanting in the horse. The skull of man is well filled with brain, while that of the horse is not, as shown in figure 57. In this figure it will be observed that it is in the posterior cavity of the skull (cranium), that the brain is lodged. Viewed from the top and front we find the skull composed of three bones; parietal, frontal and nasal. The brain lies under the frontal bone, for the most part, and gives this part of the skull the appearance of being full or depressed, as it is large or small. The brain cavity or cranium is made greater, also, as the distance from orbit to orbit is increased. The brain itself is divisible into four chief parts: The cerebrum, forming the largest and most anterior part of the brain; the cerebellum, placed behind the cerebrum; the pons Varolii, a band of nerve matter; and the medulla ob-

longata, passing between the pons Varolii and the spinal cord.

The Cerebrum the Organ of Intelligence. It is with the cerebrum, we have most to do in this chapter. Aside from quality, it is the size of the cerebrum that gives to the horse his intelligence. This can



Figure 59. A side view of the head of a horse possessing remarkable intelligence.

be determined by actual measurement of the exterior of the skull or head. In figure 58 is shown the head of a horse possessing a large brain, as indicated by the width between the eyes, and distance from eye to the opening of the ear. A horse narrow between the eyes,

will be found timid as well as wanting in intelligence. It is no easy matter to frighten a horse, possessing extreme width between the eyes; while the horse with narrow frontal bone, is always "seeing things."

The Horse of Extreme Intelligence. Figure 59 is a side view of the head of one of the most intelligent horses, if not the most intelligent, ever known. This horse was an educated one, not in trickery such as mesmeric and other tricks of man, but educated to do intelligent things. Among the other things he could do, was to be placed in a room by himself, where he would put together a set of blocks, forming a figure, which could only be formed by one way of arranging the blocks. He could open or unfasten any door that could be opened by a man, without the aid of a key. In fact all his work, was the work of an intelligent force; in many ways possessing the intelligence of the ordinary man. The frontal bone of this horse extended two and seven-eighths inches anteriorly to the eye, and the distance from the center of one eye to the center of the other, was eleven inches. I have never been able to find another head of the horse, showing such an immense brain cavity. This horse was the result of crossing a grade Percheron mare with a Saddle bred stallion.

An Intelligent Head. In figure 60 is shown the actual photographic reproductions of side and front view of the head of a Percheron stallion, which are nothing if not remarkable for brain capacity. This stallion measures ten and one-half inches between the eyes, nine inches from eye to opening of the ear, and thirteen and one-eighth inches from center of the eye, diagonally across to the opening of

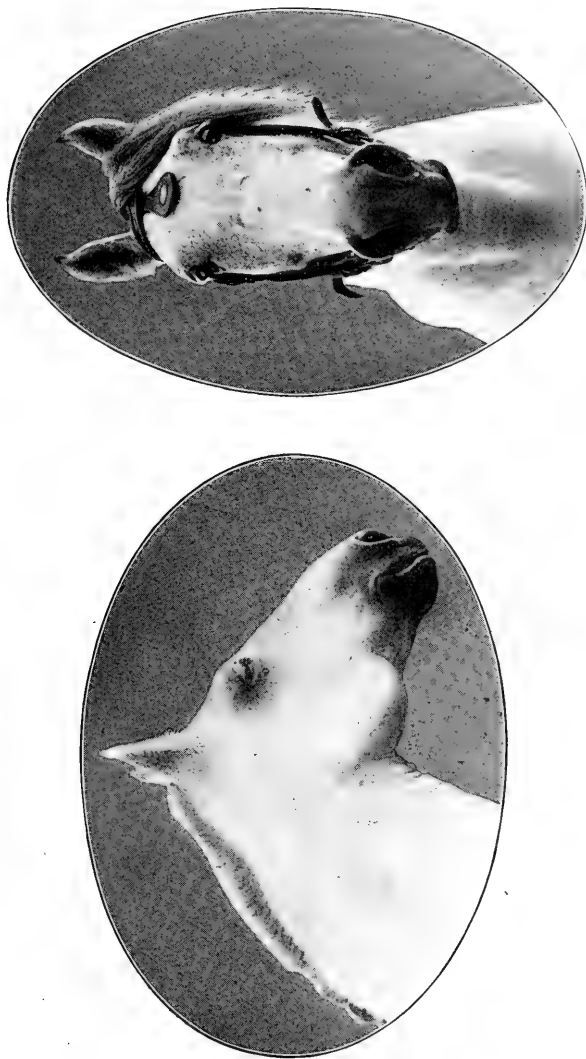


Figure 60. Front and side view of the head of an in'elligent horse.

the opposite ear. The frontal bone of his head extends two and one-fourth inches anteriorly to the eye. This stallion has been made to make services without a strap of any kind upon him, in a yard where ten or a dozen

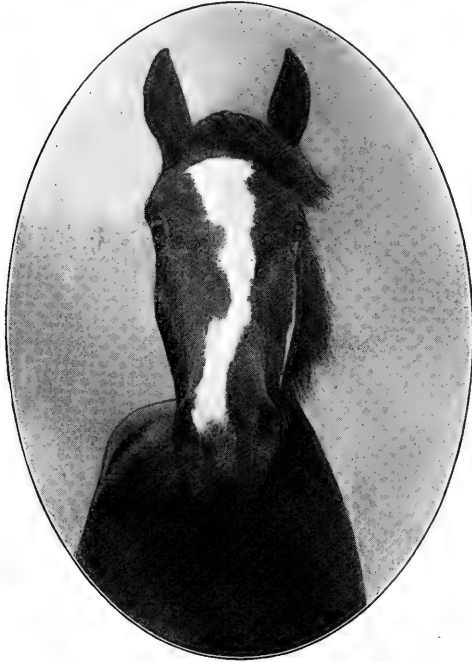


Figure 61. Front view of the head of an intelligent colt.

geldings and mares were present. The door to his stall can be left open, and he will not go out without permission, even though many horses are in sight upon the outside. He can be driven anywhere without lines, and

he will always turn to the right for any vehicle to which is hitched a horse, but if he meets an automobile, he will give no part of the road.

An Intelligent Colt. Figure 61 is the head



Figure 62. Front view of the head of a stallion with a timid disposition. This is indicated by the narrowness between the eyes.

of a colt at thirteen months. The width between the eyes, the fulness of frontal bone and distance from eye to ear all denote intelligence of a

high order. His true character does not misrepresent his phrenology, for he is a colt of the highest intelligence. One only has to show him what is wanted of him, and he is always ready to do it.

The Head of a Timid Horse. Figures 62 and 63 are front and side views of the head of a stallion too narrow between the eyes. A horse with such a head will always be found timid. His



Figure 63. Side view of the head shown in figure 62. The fullness of the frontal bone indicates a self-willed disposition.

nasal bone is full and arched, making the form known as Roman nose. This form of nasal bone is always associated with self-willed horses, and when found in connection with a narrow head, it gives us a horse that will prove unsafe to drive. The stallion whose head is shown in figures 62 and 63 is timid, will become frightened at bridges, vehicles, signs, loose paper and all other

uncommon objects. This is not all, for when so frightened he will go through a stone wall, or at least try it, to get away from the object of his fright. In every other respect the disposition of this horse is excellent, as



Figure 64. Front view of the head of an unintelligent brute. Note the depression between the eyes.

might be expected by the bright and prominent eye, and erect ear.

The Head of a Stupid Horse. Figures 64 and 65 are the front and side views of a stallion

that scarcely knows enough to eat when hungry. In figure 64 note the depression of the frontal bone between the eyes, and in figure 65 the shortness of head from eye to ear. Seldom is a head seen upon a ton horse, with so small a brain cavity, and the disposition of this horse does not belie his phrenology. I never saw a more

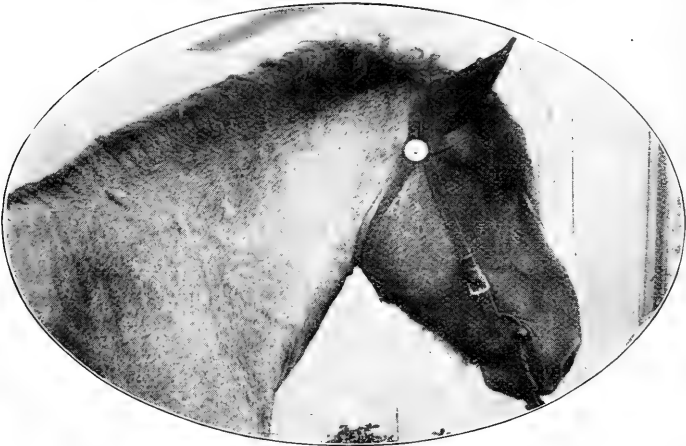


Figure 65. A side view of the head shown in figure 64. Note the shortness of distance from eye to ear. This horse does not possess ordinary brute sense, and few horses are ever seen with so small a brain.

stupid brute; even the ordinary animal instincts being poorly developed in him.

To Summarize, the character of the horse can be told by the temperament and brain capacity. The former has reference to the quality of the brain, the latter to the quantity. The motive temperament is where the development of the organs of motion are greatest. It is

in this temperament we find the most stubborn and self-willed horses. When this is balanced with a good nervous temperament we have an excellent combination, giving us both force and intelligence or quality.

The Vital Temperament is when the vital organs are greatest in their development. It is in this temperament we find most of our dull, lazy and stupid horses. With this temperament dominant we always have a good feeder and doer.

The Nervous Temperament is the outward manifestation of quality. It is the highest and best development of the brain and nerves. It is in this temperament we find our most intelligent horses. This temperament usually predominates in the trotter, the pacer, the saddler and the running horse. It is indicated by the bright and prominent eye; the fine hair and soft, velvety skin; and quality in every part.

The Proper Balance of Temperaments. The best results are found in the proper combination or balance of these temperaments. The vital is needed to feed and nourish the body. The motive is needed to give strength and force to every part, while the nervous is actually necessary to furnish the stimulation for action of every bone, and every muscle. In figure 25 can be seen an ideal combination of the three temperaments, and such a combination as is seldom seen in a draft stallion. The deep body, and good middle are evidence of vital power. The massive bone and great muscular development of motive force; while the great brain capacity and quality in every part show a wonderful nervous energy.

In the Quantity of Brain, the size of the cavity is our only guide. This is indicated by the width between the

eyes and fulness of same, together with the distance from eye to ear. Those wide between the ears, are to be watched, for they will be found vicious and treacherous. Horses narrow between the eyes, will be found timid—that is wanting in courage. The wider between the eyes, and the greater the fulness of the frontal bone, the greater will be the intelligence.

CHAPTER XV.

THE SCIENCE OF JUDGING DRAFT HORSES.

In the judging of draft horses, not enough importance has been attached to the most essential points. A nice top line may be pleasing to the eye, yet it adds nothing to the utility of the horse. Then again, the trot adds nothing in real value to the draft horse, yet much importance is attached to this gait by most judges. If a draft horse walks right, his trot will be all right, but the real drafter is not performing his work at the trot, and will seldom have occasion to use that gait.

No attempt will be made in this chapter in the way of offering a complete plan of judging draft horses from the utility view point. My time has been occupied by problems in breeding, to the exclusion of nearly every other, to such an extent that I have only recently begun the study of systems of judging, better than those now in use.

That there is need of a better system of judging can not be better shown than by referring to the score card now in use. A score of 11 is given the perfect fore-pastern and hock combined, out of a possible 100. In the case of more than 100,000 horses reported, 30 per cent of them went wrong because of defective fore-pastern and hock. In an actual test, we find an importance of 30

per cent should be attached to these two points, while in theory an importance of only 11 per cent is given them. If one can find a difference of 19 per cent of a whole, between theory and fact, existing in the case of only two parts of the horse, what may one expect when every part of the horse is considered.

A Horse is Comparable to a Machine. I am probably the only one who has ever attempted to compare a horse to a machine, constructed for a specific purpose, and by actual, mechanical tests tried to learn his weak parts. I have been carrying on these tests for some time, and have not completed my work yet.

The Balance of a Horse. The first thing I learned was the per cent of weight borne upon each set of feet. In many tests of draft horses, I found that from $56\frac{3}{4}$ to $59\frac{1}{4}$ per cent of the weight was borne upon the fore feet. The average for all these tests was slightly less than 58 per cent. In the case of the Standard bred horse, a greater weight is borne upon the fore feet, than any other breed. There is a slight difference also, in the several draft breeds, but not enough to be of any interest to the student or breeder.

How Energy is Expended. The amount of energy expended by each end of a draft horse in moving heavy loads I have investigated. In the experiment horses were used weighing from 1400 to 1900 pounds. They were made to pull from an exact level, scales being used to register the draft. Only a nominal difference was registered between the many horses used, the average being 71 per cent for the hind legs and only 29 per cent by the fore legs. This one line of investigation teaches us that the hock is the most important part of the draft

horse, and it also teaches us why so many horses go wrong in the hock.

The Proper Set of the Hind Leg. Most draft horses are either too straight or too crooked in the hind leg. A hock set at the proper angle gives more power, than when set too far back or too far forward. If the hock is correctly set as regards its position to the body; is of proper size and good quality, it will never go wrong under any circumstances. In case of accident, the bone above or below the hock will break before the hock will break or go wrong.

The Different Hock Conformations. In many tests I have made of the hocks of different conformations, I find it easy to group all hocks into three classes. These are shown in figure 67. The hock shown at "A" will never go wrong if the quality is good. Such a hock can be tested by applying mechanical power, and in practically every test, the bone will break before the hock goes wrong. In this conformation of hock it will be noticed that the point of the buttock, the point of the hock, and the back part of the fetlock are perpendicular to each other.

The Spavin and Thoroughpin Conformation. At "B" in this figure is shown a hock set too far back. Because of this set or angle such a hock will be found slightly open at the fore part of the joint, making this joint weak in its front part. It is with such a conformation that we usually find the spavin and thoroughpin. Such a hock is likely to be as strong in its back part, as the hock shown at "A" in this figure, but will always be found weak at the front part of the joint.

The Curby Conformation. The hock shown at the right in figure 67, is set too far forward and will always

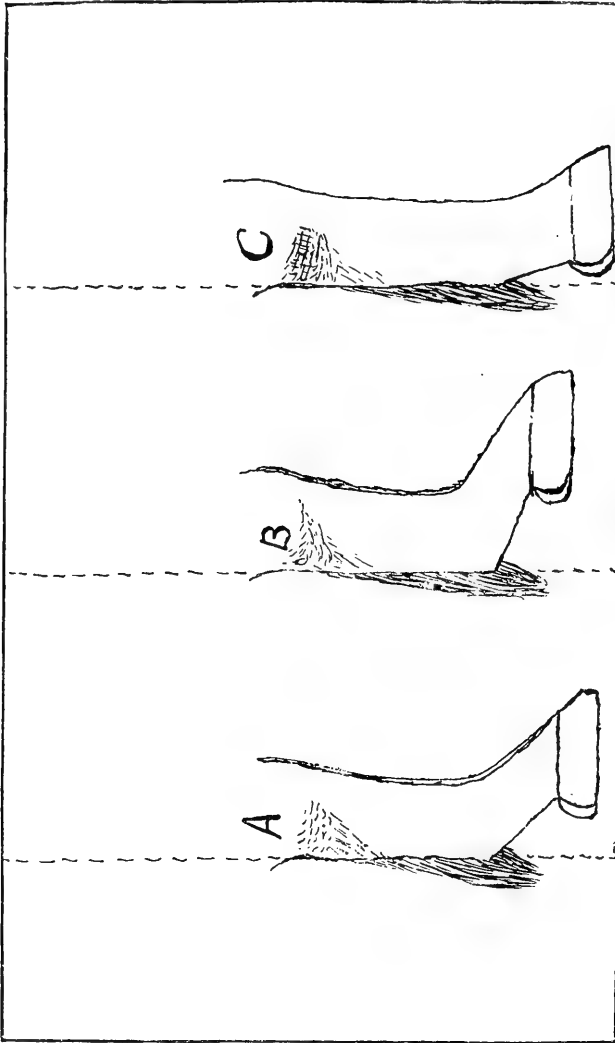


Figure 66. The different angles of the pastern of the horse. A represents the correct angle of the pastern, 45 degrees. B indicates a pastern too slanting. C indicates too straight a pastern.

be found weak at the hind part of the joint. It is with a conformation of the hock such as this, that we find the curb; while such a hock may be as strong as any in its front part.

The Importance of a Good Hock. In mailing out the circular letter, reference to which has already been made in chapter XI, copies of figures 66 and 67 were also inclosed. Reports of 101,839 horses owned were reported from this line of investigation. Of these 32,902 were reported as having become unsound. Owners of horses reporting were requested to compare the conformation of their horses with those shown in figures 66 and 67 and report the result of these comparisons. Of the 32,902 horses reported as unsound, 21,737 were reported unsound behind, 93 per cent of such unsoundness being in the hock. Here again we have evidence of the importance of a good hock, and based not upon theory, but actual fact. Of all horses becoming unsound, 61 per cent did so because of their hock going wrong. In the selection of breeding stock, no part should be given as careful attention as the hock.

The Conformation of Unsound Hocks. The conformation of hock shown at "A" in figure 67, was seldom found with an unsound hock, while the sound horses were mostly reported with that conformation. The largest number of unsound hocks was reported as being of the conformation shown at "B," in figure 67.

The Correct Conformation of Pastern. Taking up the conformation of the fore legs, of the 32,902 horses reported as unsound, 11,165 of them were reported unsound in front. As regards these, 10,378 were reported with short and straight pasterns. Some were reported as having rather poor feet at the time of their purchase,

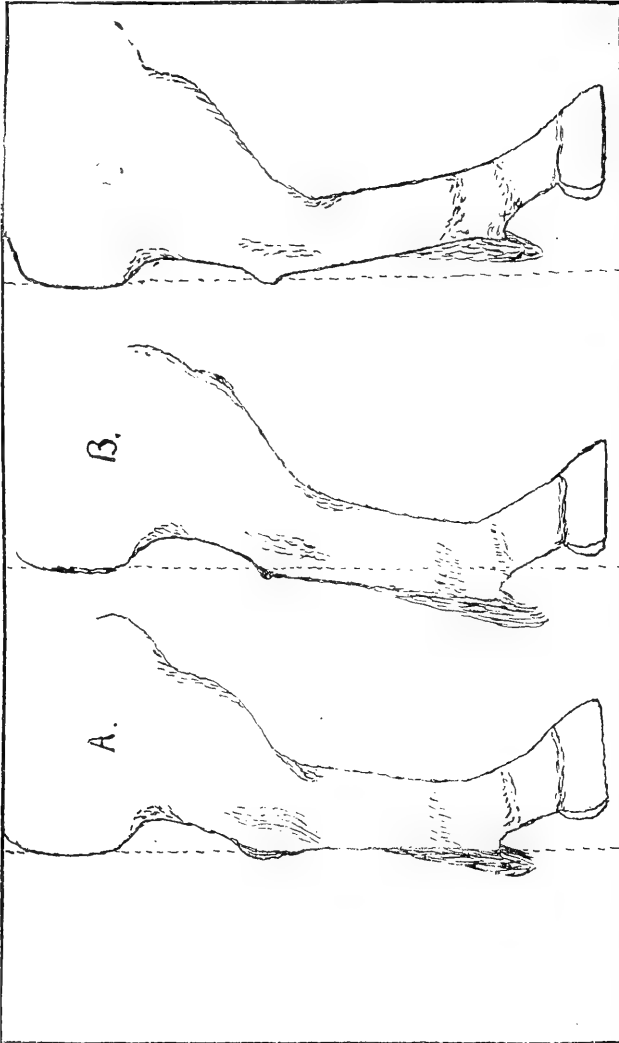


Figure 67. The positions of the hind legs. A denotes the correct position of the hind leg. A hind leg attached to the body in this manner seldom goes wrong. It will be noticed that the point of the buttock, the point of the hock, and the back part of the fetlock, are perpendicular to each other. B denotes a leg set too far back. This set of leg is likely to go wrong in the fore part of the hock, with spavin or thoroughpin. The leg at the right is set too far forward and is likely to go wrong in the back part of the hock by developing a curb.

but where the pastern was of proper length and elasticity, the feet had remained in about the same condition. Upon the other hand, horses purchased with good feet, but short, straight pasterns, soon became crippled in their feet. In no instance was a shoulder lameness reported, that the horse did not have a straight pastern.

Unsoundness Resulting from a Short and Straight Pastern. It can be readily seen that without a pastern of reasonable length and elasticity, to aid in dissipating concussion, the draft horse will not long remain sound in front, when used upon the paved streets of the cities. Taking the reports together, it will be seen that short and straight pasterns in front and defective hocks behind, are responsible for most of the unsoundness of our draft horses. The table below will show the defects, both as to kind and numbers of the 32,902 horses reported unsound.

Fore feet	2337	7.4	per cent
Sidebone	4186	12.7	“
Pastern	978	2.9	“
Fetlock	1269	3.8	“
Knee	7	.02	“
Elbow	69	.2	“
Shoulder	2319	7.	“
Hind feet	43	.13	“
Pastern	107	.32	“
Fetlock	1282	3.9	“
Hock	20215	61.4	“
Stifle	61	.18	“
Hip	29	.08	“

Sidebones. No attempt has been made to indicate the unsoundness by giving it a name, the location of the trouble only being given. The one exception to this

rule is in regard to sidebones. This defect was of such frequent occurrence, I deemed it best to let it be known, as 12.7 per cent of all unsound horses were troubled with sidebone. Here for the first time is given the location, and per cent of frequency of the occurrence of unsoundness in draft horses, as one may reasonably expect to find them upon the streets of our cities. The four weakest parts of the draft horse, in the order of their frequency, is the hock, with 61.4 per cent; the fore pastern (including coronet), with 15.6 per cent; the fore feet, with 7.4 per cent; and the shoulder, with 7 per cent. It has already been observed that the defects of feet and shoulder were aggravated at least by a defective pastern. In very many instances they were directly caused by a defective pastern. Reducing the number of weak points in the horse as much as possible, and we find that about 85 per cent of the unsoundness reported, was the result of defective hock and pastern. Taking the entire number of horses reported, sound and unsound, about 20 per cent were defective in the hocks, and about 10 per cent were defective in the fore pastern.

The Importance of Good Hock and Pastern. No such importance as this, has ever been given to these two points of the draft horse, by any judge or system of judging in this country. Here also, is one of the reasons why so little value is placed upon prize winning horses, by the great mass of people, and especially breeders. Exhibitors will themselves prize first prize winners below those winning no place in the same class. It also explains in a measure, why our best horses are never shown.

The Value of Good Eyes. The next most important point in the horse, is the eye. It is very important, both

because of the utility value it gives the horse, and the tendency to inherit defective vision. In a report upon 49,317 horses used in this country, eight years or more of age, 5,013 had some inherited defect of the eye. These reports were based upon the examinations of veterinarians, and must be considered reliable. Such a report is startling, however, and well may be, when some more than 10 per cent of the commercial horses of a country have defective vision. It is much more than I would have been inclined to believe, if I had not the figures before me. This is in a measure a breed defect, as the grade Percherons were found much more defective in this respect than any other breed.

Intelligence and Temperament. The brain development of the horse, including temperament, plays a much more important part in making up the value of a horse than has ever been accorded it. The greater the brain development in the draft horse, the more easily his work is done, the more pleasure the driver experiences in the handling of his team, and the less wear upon the horse as a result of his willingness to perform every duty required of him.

The Standard, or Scale of Points Used in Judging Horses. Again taking up the subject of a standard for draft horses, I wish to refer to the standard now in general use. I do so with no disrespect intended its Author, for no man living holds him in higher esteem than myself, nor does anyone appreciate the value of his work to American breeders more. The following is the standard now in general use:

General Appearance: Weight, over 1,500 lbs., according to age	4
Form, broad, massive, proportioned	4

Quality, bone smooth and hard, tendons lean, skin and hair fine	4
Temperament, energetic; disposition good	4
Head and Neck: Head, lean, medium size, well developed jowls	1
Muzzle, fine; nostrils large; lips thin, even.....	1
Eyes, large, full, bright and clear.....	1
Forehead, broad and full	1
Ears, medium size, well carried	1
Neck, muscled, crest high; throat-latch clean, wind-pipe large	1
Forequarters: Shoulder, sloping, smooth, snug, extending into back	2
Arm, short, well thrown back	1
Forearm, heavily muscled, large, long and wide.....	2
Knees, wide, clean cut, straight, deep, strongly supported	2
Cannons, short, lean, wide; sinews large, set back...	2
Fetlocks, wide, straight, strong	1
Pasterns, sloping, lengthy, strong	3
Feet, large, even size; horn dense; sole concave.....	8
Legs, viewed in front, a perpendicular line from the point of the shoulder should fall upon the center of the knee, cannon, pastern and foot. From the side a perpendicular line dropping from the center of the elbow joint should fall upon the center of the knee and fetlock and back of hoof.....	4
Body: Chest, wide, low, large girth.....	2
Ribs, long, close, well sprung	2
Back, straight, short, broad	2
Loins, wide, short, thick, straight	2
Underline, flank low	1
Hindquarters: Hips, smooth, wide	2
Croup, wide, muscular	2
Tail, attached high, well carried	1
Thighs, muscular, strong and deep	4
Gaskins, wide, heavily muscled	2
Hocks, clean cut, wide, straight	8
Cannons, short, wide	2

Fetlocks, wide, strong	1
Pasterns, sloping, strong, lengthy	2
Feet, large, even size, dark color, horn dense	6
Legs, viewed from behind, a perpendicular line from the point of the buttock should fall upon the center of the hock, cannon, pastern and foot. From the side, a perpendicular line from the hip joint should fall upon the center of the foot and divide the gaskin in the middle; and a perpendicular line from the point of the buttock should run parallel to the line of the cannon	4
Action: Walk, smooth, quick, long, balanced and springy	6
Trot, rapid straight, regular	4
Total	100

It will be seen that the above scale of points gives the eyes an importance of but one per cent of the full perfect score; the fore pastern but three per cent; and the hock but eight per cent; while in actual tests the eyes should be given 10 per cent, the pastern in front 10 per cent, and the hock 20 per cent. This is a wide difference, but just so long as standards are based upon theory, just so long will we find judges differing, and horses winning high honors valued below those winning no place in the same class. Theory has been doing too much for the good of the breeding industries, especially that of horse breeding. It has never occurred to judges of horses, that judging might be reduced to a science, based upon actual facts.

In the Judging of Fat Cattle this has been done. The animal to be judged is divided (mentally) into the commercial cuts, and when the judging is finished, one has an idea of which animal would sell for the most money in the open market. There is no known reason why the

same rule cannot be applied to the judging of draft horses.

A New Scale of Points. I believe the following scale of points will be found more nearly correct, as regards the relative importance of each part of the horse, than any ever formulated.

Form and Quality: Attachment of legs; viewed from in front and behind, the legs should be well set under the horse; viewed from the side they should be perpendicular to the body	4
Weight, over 1,800 lbs., according to age	4
Temperament, as indicated by smooth and hard bone, skin and hair fine, with an abundance of energy . . .	5
Head and Neck: Intelligence, as indicated by width and fulness between the eyes, and good length from eyes to ears	5
Eyes, large, full, bright, and of a hazel color	10
Ears, medium size, carried erect	1
Neck, muscled, good crest, wind pipe large, throat-latch clean	2
Forequarters: Shoulder, sloping, well muscled and extending into back	2
Arm and forearm, well muscled	2
Knees, wide, straight, well supported	1
Fetlocks, wide and strong	2
Pasterns, sloping 45 degrees, good length, elastic . . .	10
Feet, large, even size, dense horn	5
Body: Chest, wide, low, large girth, not less than 86 inches in mature horse	2
Back and loin, short well muscled	1
Underline, flank low and well filled	2
Hindquarters: Hips and croup, wide, well muscled . . .	2
Tail, attached high, well carried	1
Thighs and gaskins, muscular	2
Hocks, clean, wide, straight	20
Fetlocks, wide, straight, strong	3
Pasterns, sloping, strong	2

Feet, large, even size, dense horn	2
Walk, straight, regular, smooth, long, quick, balanced and elastic	10
Total	<u>100</u>

The above standard is intended at the present time as a suggestion only, believing it will be found more nearly correct than any ever suggested. It has one serious defect, however, that of good lungs and wind. I am now investigating this point upon a large scale, but have not yet the data at hand to make an accurate report, or even suggestion. Defective wind is also too common in this country.

CHAPTER XVI.

FEEDING THE HORSE.

In several preceding chapters the subject of feeds or feeding had to be taken up, but only because of its influence upon the subject then under discussion. This chapter is not intended to be more than an aid to the breeder, in the feeding of his horses.

The Amount of Nutriment to be secured by the horse from any kind or quantity of feed, depends upon its mastication, the action of the salivary glands and the gastric fluids. The food is first reduced by the molar teeth, assisted by lips, tongue and cheeks, in passing it to the place of grinding and holding it in position. In the horse the lower jaw is about an inch narrower than the upper, so that grinding is possible on but one side at a time. As mastication proceeds, the feed is mixed with saliva poured upon it from glands opening into the mouth.

Experiments Made by Colin made it possible for him to state that it required nearly twenty minutes for a horse to masticate one pound of dry hay, and that four pounds of saliva was secreted and poured out upon every pound of dry fodder consumed. Oats required a little more than their own weight, green fodder about half. It can be seen that the more thorough the mastication

tion, the more perfect the digestion following. In other words the more time consumed in the mastication of his food, the better will the digestion of the horse be carried through. In this connection for feeding grain, an automatic feeder has many advantages over feeding in an open trough. Digestion is further aided by the gastric fluids poured upon the food after it enters the stomach. The stomach of the horse is so small that it cannot contain much feed at one time, because of which the food is constantly being pushed on and out of the stomach before it has been long acted on by the gastric juice. The large intestine of the horse has a capacity of about six times the stomach, permitting the retention of a large quantity of food. The capacity of the stomach of a mature horse is but eighteen to twenty quarts. The entire alimentary canal is but a system of glands, secreting fluids to aid the process of digestion.

The Elements of Food. Foods may be divided into three elements or classes of nutrition: protein, consisting of the nitrogenous substances of the food; fat, which are absorbed unchanged in the form of an emulsion; and carbohydrates, which are converted into some form of sugar, which enters the blood by absorption from the intestinal canal.

A Proper Balance of Nutrition. We have now reached that part of our subject, where trouble is easily in evidence. Food products can be so compounded, that a proper balance between the three elements of food nutrition may be maintained, and yet not be the correct ration for the animal we are feeding.

Acids and Bases. The Ohio experiment station has recently concluded experiments, and announced the

same in their bulletin number 207, dealing with balanced rations for animals from a new standpoint. The one thing of most value to feeders and breeders resulting from this experiment, is that not only should there be a balance between the protein and other food elements, but that the balance between the inorganic acid and base forming elements in the food should also be maintained; that the acid formers should not predominate over the bases in the feed.

Inorganic Matter. There are in all food stuffs minerals taken from the soil by the plant. These minerals form the ash left when the portions of plant material are burned, and because they are not destroyed by fire they are called inorganic. Some of these elements which remain behind in the ash when foodstuffs are burned unite with oxygen and water to form acids; others unite with oxygen and water to form what is known as bases, of which slaked lime is a good example. Now the process to which foods are subjected in the body is really a burning process; at all events the end products are similar to those resulting from ordinary burning. Thus when foods are taken into the body these inorganic elements form acids and bases as final products.

The Balance Between Acids and Bases. Bases and acids each have peculiar properties. However, when an acid and a base are brought together they neutralize each other and the resultant product is something entirely different from either of the original compounds, having lost all its active and irritating properties. In the animal body, as we have said, the inorganic, or ash elements, of the food form acids and bases. If the base formed is in excess of the acid, the acid is neutralized

and the functions of the body continue normal, since the normal condition of the blood and body tissues seem to be slightly basic. If, however, the acid formed in the body as a result of the breaking down of the food materials is in excess of the bases, then an abnormal condition results, and if long continued, the animal will be affected with a disease known as acidosis or acid intoxication. This may become so serious as to cause the death of the animal.

Sulphur and Phosphorus Found Mostly in Protein Foods. In the common foodstuffs on the farm the mineral substances which produce acids in the body are sulphur, phosphorus and chlorine; those which produce bases are potassium, sodium, calcium and magnesium. These are found in various combinations in plants and feeds, but the greater part of the acid-forming substance in the animal body comes from sulphur and phosphorus. The sulphur of feeds is contained almost entirely in the protein or muscle-forming part; phosphorus is contained in a number of forms in feeds, but most largely in the protein, also. Thus it will be seen that any feed rich in protein will cause the formation of a large amount of inorganic acid in the animal body. This requires that high protein foods have sufficient base-forming material accompanying them to insure that the acid formed in the animal body will all be neutralized.

The Cause of Small Bones. It will be seen from this that the balance between the acid-forming elements and the base-forming elements in the ration for animals is of great importance. This balance is indicated by the analysis in the ash of the feeds, which shows the relative proportion of the two classes of elements. Unless suffi-

cient base-forming material is present in foods, the bones themselves will be robbed to supply bases to neutralize the excess of acid. A condition of this kind is the cause of rickets, porous bone in old animals; and of a lack of bone development in young animals where the ash content of the food may be high, but where the acid-forming and base-forming elements are not balanced.

Corn Has an Acid Ash. In straight corn feeding we see the resultant of a complication of deficiencies; corn lacks protein as well as minerals. In the ash, both acids and bases are deficient but the bases considerably more so than the acids, so that as an only food, corn is characterized by an excess of acid mineral elements, and this excess, together with the deficiency in the total amount of mineral matter present, limits the growth of the skeleton; but if the protein in the ration of the corn-fed animal is increased by the use of supplements, to such an extent as will support a maximum production of protein increase, then both phosphorus and the mineral bases must be increased.

The Quantity of Ash Required. The basic mineral elements in a ration must be present in quantities corresponding to the protein, since the sulphur and phosphorus of the food proteins constitute the principal sources of mineral bases in the food but also that this excess be maintained at a high level; that is, that aside from the balance between acid and base, the total quantity of ash should be considerable.

Alfalfa and Clover are very rich not only in protein but also in the mineral bases, so that they make a fine supplementary food for corn. That alfalfa gives such excellent results when fed with corn to horses can be

accounted for in no small degree by the fact that it is so rich in mineral bases.

Corn Makes a Poor Showing When Fed to Breeding Animals. This necessity of maintaining the balance between the inorganic acid and base-forming elements, explains why it is impossible to make an ideal ration for horses used for breeding purposes, when any part of that ration is corn. It will be remembered that in a former chapter I mentioned instances of both stallions and mares being kept on an exclusive grain ration of corn for two or three years without apparent injury, and then have them go wrong, becoming barren or nearly so, seemingly at once. In all the data, collected upon the subject of barrenness, in no case did a ration of which corn was a part, make a good showing.

The Minimum Amount of Nutriment. Food supplies materials for making good the waste of body tissues. If the supply is liberal and exceeds the demands of the body, the horse will gain in flesh and weight. If the supply is only equal to the material broken down, the weight of the horse will remain unchanged. If the supply is below the actual demands of the body, the horse will lose weight. There is a minimum amount of nutriment absolutely necessary for the maintenance of life.

The Protein of the Food is the only source of nitrogenous substances in the body. The formation of flesh, therefore, is primarily dependent upon the supply of protein in the food. Any excess of protein in the food of a horse is disposed of through the excretion of urine. The decomposition of nutritive material of the blood and body tissues, goes on as long as the horse lives, and this

is known as protein consumption. Neither fat nor carbohydrates, when fed alone, have any influence upon protein consumption. The body would decompose the same amount of protein, in the case of exclusive feeding of fat or carbohydrates, as if no food whatever was given. When a balanced ration is fed, consisting of protein, fat and carbohydrates, the consumption of protein depends wholly upon the supply of protein in the food.

The Feeding of Salt daily in moderate quantities to horses, increases the secretion of the body fluids and their circulation, and increases the energy of the vital processes. It also has a stimulating influence on the appetite of the horse, and should always be a small part of the ration for all breeding horses.

Nervous Energy is Increased by Protein. One very noticeable thing in the making of a ration for a horse, is the increase of nervous energy noted as the ration is narrowed; that is as the protein is increased at the expense of the carbohydrates. This teaches us that the ration may be widened for horses not at work. The ratio of the legumes usually fed the horse, such as the clovers and alfalfa, will average about 1:3½, while for other fodders, or coarse foods it will run from 1:7 up to 1:12. Horses fed upon the former always display the more energy. The same is true of concentrates or grains. The ratio of oats is 1:5 while that of corn is 1:7, and a ratio of oats always gives the greater energy. By ratio is meant in this chapter, the ratio of protein to carbohydrates.

The Digestibility of foods differ, but the average digestibility of the protein and carbohydrates found in the foods usually given the horse is about 80 per cent.

If one was to follow a system of balanced ration feeding, for every 1,000 pounds of weight should be given 20 pounds of food (dry matter), in which could be found two pounds of protein and eleven pounds of carbohydrates. Seldom can two horses be found in the same barn requiring the same amount of food. It is because of this that more skill is required in the feeding of horses than any other animals.

In Conclusion, as already stated in previous chapters, I would feed no corn to horses which were to be used for breeding. Corn stover, free from dirt and dust is good. Also any hay well cured, and free from mold or dust. The clovers and alfalfa fed in moderation have no equal. Oat, barley and wheat straw are safe to use, and can be used with the clovers and alfalfa to advantage. Grasses or grains likely to contain ergot should be avoided. Millet should never be fed a horse of any kind. Sorghum hay or fodder is hazardous at best. Kaffir fodder has proved a very fair food for the horse in several localities, but I have never used it. The best single grain ever fed a horse is oats. Crushed barley is the next best, but should be crushed, and not ground. Wheat bran is good when mixed with other feed, but will not be needed if clover or alfalfa is used. Shorts and middlings form a pastry mass in the stomach of a horse and should not be used. Kaffir corn ground has proved a very fair food for a horse, but is improved with a mixture of oats. Cotton seed meal should never be used, and linseed meal only in small quantities. After all is said, the secret of successful feeding lies in so feeding the horse that he may be found at his best at all times, and what may be best for one, may not prove best for another.

APPENDIX.

BREEDING FACTS WORTH REMEMBERING.

Salt. Breeding animals should have all the salt they will consume. They are prolific, or otherwise, in proportion to the salt solutions found in the body.

Evidence of Virility. A stallion's desire, or readiness to copulate, is no evidence of his virility. Some of the most virile stallions are very slow servers.

Fat in Breeding Animals, is a potent factor in the cause of both impotency and degeneracy.

Death of Foals. Most of the young foals dying, are those coming early, rather than those coming later in the season.

Evidence of Pregnancy. The only satisfactory way of knowing whether or not a mare is pregnant, is by examination via the rectum. After the third month, this can be done safely, and with certainty.

Frequency of Service. A draft stallion will sire more live foals on one service per day, than he will by making two or more services daily. Excessive service is a frequent cause of sterility, besides producing many weakly foals.

Capsule Service. Where the work is properly done, capsule service will result in 30 per cent more foals than natural service.

Brood Mare. Give the brood mare a chance, her foal will sell for more money than her labor.

Foals. To mature a foal into a good horse, requires good feeding as well as good breeding. If five pounds of oats per day will make a good foal, ten pounds will make a better one.

Educating Colts. An hour spent in the early training of a colt, is worth more than a week spent later in breaking.

Pure Air. No tonic ever sold over a drug counter, is worth as much to breeding stock, as pure air.

Pure Water. To do their best, horses need pure water quite as much as yourself.

Exercise. No colt will mature into a good horse, nor will a stallion sire the best foals possible, without an abundance of exercise.

Working Mares. There is no reason why mares can not be worked and produce good foals, yet taken as a whole, they never have been. This should serve as a lesson in teaching us to work them carefully, and with good judgment.

Grass. There is no food so good for the brood mare and foal, as good grass, especially when used in connection with oats.

Hocks. Look well to the hocks of the stallion used upon your mares. No part of the horse is of such vital importance.

Showing Stock. As our shows are now conducted, mares can not be used for both the show ring and breeding. It is for you to decide which use to make of them.

Advertising. If you are going to advertise your horses, as a means to selling them, patronize journals read by actual buyers. Breeding good horses only, is the best advertisement.

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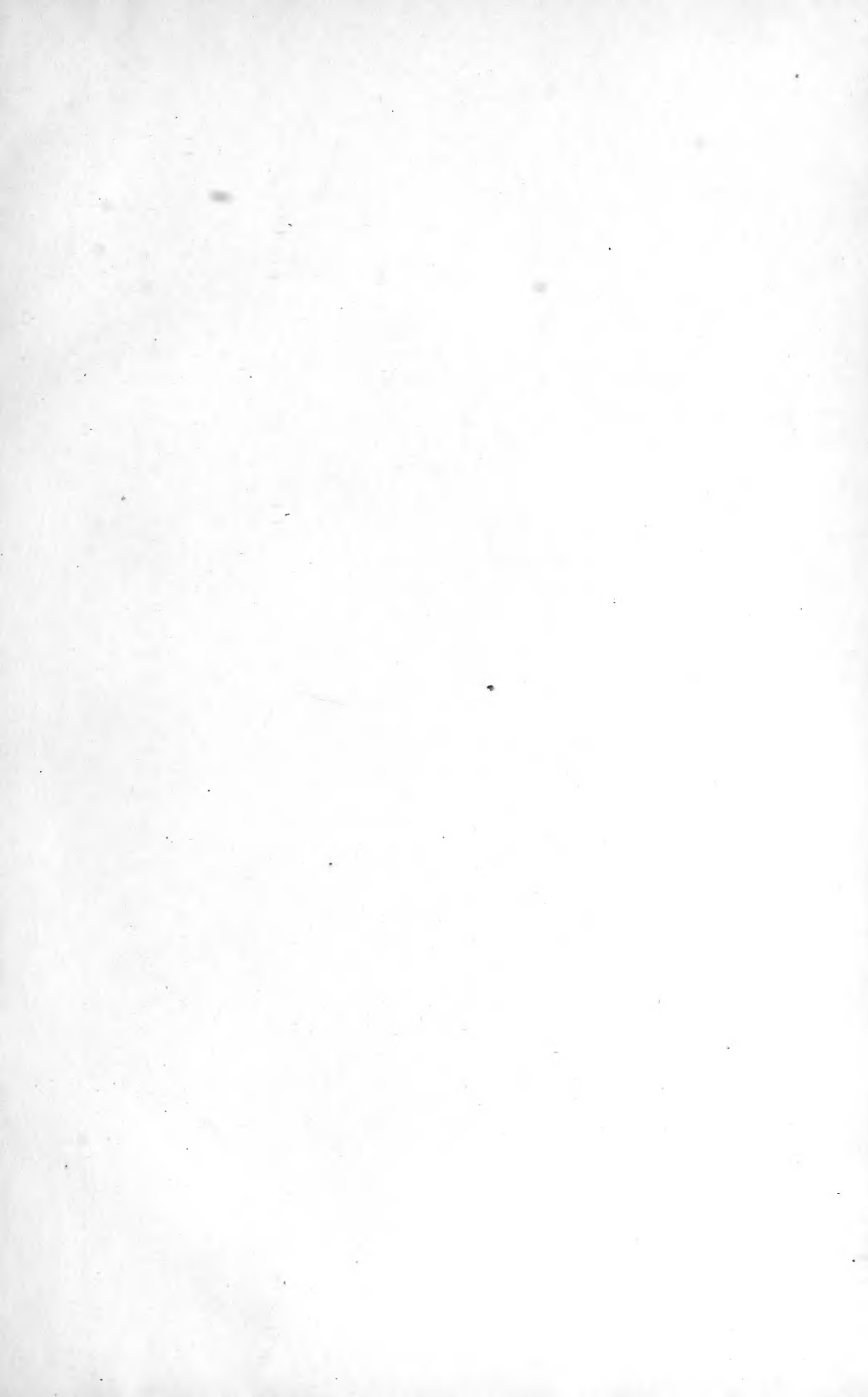
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