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ANIMAL CASTRATION

A Book for the Use of
Students and Practitioners

246 Pages

With over 200 Halftone Illustrations from Original Photographs

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PREFACE TO SECOND EDITION

The first edition of this work came from the press during the latter part of 1914. The entire edition, twenty-five hundred copies, was exhausted more than a year ago. Thanks are due, and are now extended to the veterinary profession of America and of all other English speaking countries for the hearty reception accorded it. Apologies are offered for several typographical errors which appeared in that edition in spite of our best efforts to avoid them. We console ourselves with the belief that the initial issue of most other professional publications—some even by experienced authors—contain their proportion of errors, and that most of our readers were charitable enough to overlook them.

It will be observed that this second edition contains considerable new matter and some new and better illustrations, which we trust will improve and make the text more instructive.

The author, without assistance, financed and published the first edition, but in the face of present post-world-war, unsettled conditions, he has hesitated, for more than a year, to undertake the publication of a new edition. However, without solicitation from any source—except, perhaps, from prospective purchasers—*The American Veterinary Publishing Company* generously offered to shoulder full financial responsibility for a second edition of "Animal Castration". This offer was made notwithstanding that the price of every item of expense incident to book publication is greatly inflated and all out of proportion to prices of normal times. If this publication is valuable to the profession or to individuals comprising the profession, credit for its appearance at this time is due the publisher.

G. R. W.

Nashville, Tennessee,
June, 1920.

PREFACE TO FIRST EDITION

To those entrusted with the onerous task of castrating and spaying domestic animals, the scantness of modern literature—especially that printed in English and by American authors—dealing with the subject, must have always proved a matter of considerable embarrassment.

This universally recognized lack of a well illustrated book on the important subject of unsexing animals, has induced the author to write and publish this volume.

It is offered with the desire and hope that it will—in a measure at least—close this wide gap in our English speaking literature.

Twenty-one years' actual and active experience in city and rural practice, as well as several years as a teacher of this particular subject, leads me to believe that a textbook well illustrated, written by an American, based on American methods, will be acceptable to the student and practitioner who really has a desire to become proficient in performing the operations of castration and spaying. The illustrations and text are for the most part original. The methods described are those employed in actual everyday practice by the author.

In presenting this volume, the author's only regret is that during its preparation he was State Veterinarian of Tennessee, and did not have the time at his disposal to insure the best authorship. Hence he is constrained to appeal for lenient judgment and criticism on the book prepared under no common stress of duties—administrative, professional, social and political.

GEORGE R. WHITE.

FOREWORD

INSTRUMENTS

The first essential to the proper performance of the operations of castration and spaying is instruments of proper design made from material of unquestioned quality.

Instruments of the same external appearance—which usually means nothing more nor less than finish, and finish in turn merely means polish and plate—may vary greatly in quality of material and workmanship.

Never purchase cheap instruments at any price, as they are not satisfactory or dependable. The best are none too good, as oftentimes an instrument will make or unmake a man's reputation as an operator.

If these operations—castration and spaying—are to be done neatly and with dexterity, antiquated instruments have no place in the operative technic. Nothing conduces quite so much to awkwardness in operating and an all around "bunglesome job" as do instruments of improper construction.

There are numerous castrating and spaying instruments offered to the public, that are bad, and others worse than worthless for the purpose for which they are intended. The one admonition the author would offer above all others is to exercise extreme care and good judgment in selecting castrating and spaying instruments.

Most manufacturers of surgical instruments and their shop mechanics, have little or no conception or practical knowledge of the actual requirements of the instruments which they make and sell.

Unless the purchaser knows what he wants, he is at the mercy of the ignorant manufacturer, and is liable to make mistakes in purchasing which will cause embarrassment later when actually engaged in operating.

Remember that there are several grades and many designs of castrating and spaying instruments. Always call for "A grade," and see to it that you get exactly what you call for, and select the design best suited for your requirements.

Numerous instruments are illustrated and described in the following pages. Where only one pattern of an instrument is shown, it means that in the author's opinion that particular instrument has advantages over all others and is the proper one to purchase. Where two or more instruments of the same character are shown, it means that the author has no prefer-

ence and that both instruments are equally satisfactory; either may be purchased without making a mistake.

Each and every instrument illustrated in this volume possesses merit, and no mistake will be made in selecting any of them. Our object in thus illustrating and describing the instruments is that the novice may have the advantage of the author's more than a quarter of a century's experience in selecting and using this class of surgical instruments, and with the hope that the information herein contained may in a measure at least protect the inexperienced castrator from waking up later to the fact that he is in possession of a lot of useless "junk" which has been sold to him for castrating and spaying instruments.

METHODS

It will be further observed that only one method of operating is illustrated and described; quite a revolution in this class of literature. All antiquated methods and operative technic have been purposely omitted in order to avoid confusion and embarrassment. The methods mentioned are those which most appeal to the author's fancy, and while he considers them the best, safest, and most satisfactory, he lays no claim to their being the only good methods, and is perfectly willing to accord to others the privilege of using other methods if they so desire without quarreling with them.

RESTRAINT

Restraint of domestic animals, in the broadest acceptance of the term, means much to the average busy, active practitioner of veterinary surgery.

Each species of our domestic animals is endowed with one or more means of defense. These are oftentimes—in individuals of certain temperament—converted into weapons of offense. The horse will strike, kick and bite; the ox will gore and kick; the dog and hog will bite. It is these weapons of offense that we are called upon to control and overcome by restraint. These animals must be rendered harmless by the means of restraint which we have at hand. The particular method employed, of course, depends largely upon the animal and the degree of restraint necessary.

While it is constantly found necessary to employ methods of animal restraint, one should always employ them in as humane a manner as possible. Humanitarian treatment is as essential here as elsewhere in the practice of veterinary science. We should never take advantage of an animal when confined in order to cause torture or to inflict unnecessary pain of any kind.

The surgeon is confronted with problems of restraint or some method of subjection almost every hour of each day of his professional career.

Not only does the restraint problem confront and concern the surgeon,

but his client and patient are also directly interested to a marked degree. The surgeon owes it to his client, his patient and himself to become proficient in properly and securely restraining animals for examination and operation. Without efficient means of restraint the surgeon is in constant danger of great bodily harm; the animal in danger of self-inflicted injuries as a result of its own efforts at resistance, thereby causing the owner financial loss, which can and should be avoided by proper methods.

In order to cast and secure an animal properly and successfully, the operator should possess coolness, good judgment, and plenty of courage and confidence. He should retain his equilibrium in spite of any untoward accident or emergency which may chance to take place. Self-confidence and good judgment are both valuable assets in performing operations of the character which this book undertakes to illustrate and describe. The surgeon should get control and remain in control from the time the twitch is placed on the animal—preparatory to applying the hobbles or casting harness—until the animal is again on its feet. Experience and dexterity are not to be underrated in the operator who is to undertake the task of securing and properly confining the larger domestic animals. Do not allow yourself to become excited or unduly alarmed or aggravated should everything not move as smoothly as you expect or desire, for in so doing the surgeon is not in sufficient possession of his mental faculties to do justice to himself, his patient or his client.

Perfect, or even good, surgery is impossible without perfect restraint. The surgeon's success depends largely upon the restraint method used. It is rare to see a surgeon handle a knife any more skillfully than he handles his restraint technic. Imperfect restraint means imperfect operation.

The particular methods of restraint necessary for each operation and the details pertaining to same will be specifically described under the proper headings.

G. R. W.

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PART I.

CASTRATION

Definition—Orchectomy; excision of one or more testicles. The term castration is also applied to the removal of ovaries from the female. However, when the word castration appears in this volume—with the exception of the title—it has reference to unsexing the male animal.

History—Castration is one of the most ancient of surgical operations upon animals. It was advocated and practiced as early as seven centuries before the Christian era. Time has not lessened its application or usefulness. In fact, during recent years it has rapidly increased in popularity until now it is considered one of the most useful and valuable operations in the whole domain of animal surgery.

It is practiced without hesitancy upon all domestic and wild animals, and its economic value cannot be overestimated.

The earlier modes of operating were as follows: Martelage, tearing, scraping, torsion, firing, bistournage, ligation and clamping. These ancient methods were extremely painful, and by some considered cruel and inhumane. They have all been superseded by less painful and more modern ones, the most recent of which are emasculation, vasectomy, bisection, vaseligation and, lastly, vas-occlusion, recently advocated by Dr. Napoleon Berdozzi, of Italy. While the above have been mentioned simply from an historic standpoint, one of them, *viz.*, emasculation, stands out prominently as the best, most widely practiced and most satisfactory method of operating, and on this account the emasculation method will be adhered to in all instances where it is applicable, in this work.

CHAPTER I.

CASTRATION OF THE STALLION.

Objects and Indications—While the operation is most often practiced as an economic procedure to increase the animal's value and usefulness to mankind, it is nevertheless valuable as a corrector of many acquired vices, such as masturbation, viciousness, etc. It is also indicated in impotency, some diseases of the penis, scrotum, spermatic cord, and testicle. Its effect is both mental and physical.

The operation has a decided tendency to render the animal quiet and docile and to alter the conformation in some material respects, such as lessening the development of the shoulders, chest, neck and withers. While on the other hand the development of the hind quarters is stimulated.

Castrated stallions are known as geldings.



Fig. 1—Stallion cast with Conkey self-locking buckle hobbles. Leg P being drawn from over field of operation by rope R S.

Age—Stallions may be safely castrated at any age provided they are in good physical condition.

Season—Spring and early fall are the seasons of choice, but the operation may be performed at any time by taking the necessary precautions to protect the animal from flies, inclement weather, etc.



Fig. 2—Williams' all-metal, stiff handle castrating knife.

Preparation—The intestinal tract should be practically empty at the time of castration. This is attained by withholding food for twenty-four hours before operating. By heeding the above admonition the danger of rupturing internal viscera during the operation and of colic afterward, will be much lessened.

CASTRATING IN THE RECUMBENT POSTURE

Restraint—When it has been decided to cast the animal, one should, first of all, carefully survey the surroundings and select the most satisfactory location. Of course circumstances and existing conditions play an

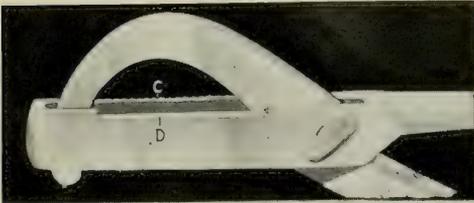


Fig. 3—A perfectly made emasculator of good design.

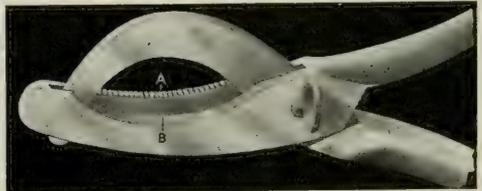


Fig. 4—An imperfectly made and badly designed emasculator.

important role in making a selection. When the weather will permit, there is no place better adapted to the operation than an open field or lawn. There one has ample room to manipulate the restraint technic without interruption. When the location has been selected, the next problem is the casting bed. The ideal operating mat or mattress is a plot of green grass upon smooth ground. Always avoid the manure heap or the rotten straw pile whenever possible. They are both hotbeds of all forms of bacterial growth and are directly responsible for many cases of fatal septic infection. If one is forced to cast an animal indoors, one must make the

best of the misfortune and devise means and methods to best overcome that handicap. Select the place—be it hallway, stall or operating room—where the most room is available. Then a proper bed must be prepared with tanbark, soft wood shavings, straw, hay, excelsior, sawdust, etc., or a specially constructed mattress or pad may be used.

Lead the animal to the proper position, put on the twitch, apply the Conkey self-locking, buckle hobbles and cast it on the left side. (Fig. 1.)

When cast, the off hind leg should be released from the hobble strap and with an 18-foot rope looped above the fetlock (P) and passed over the withers (Q) and under the neck, then back above the hock (R) the leg

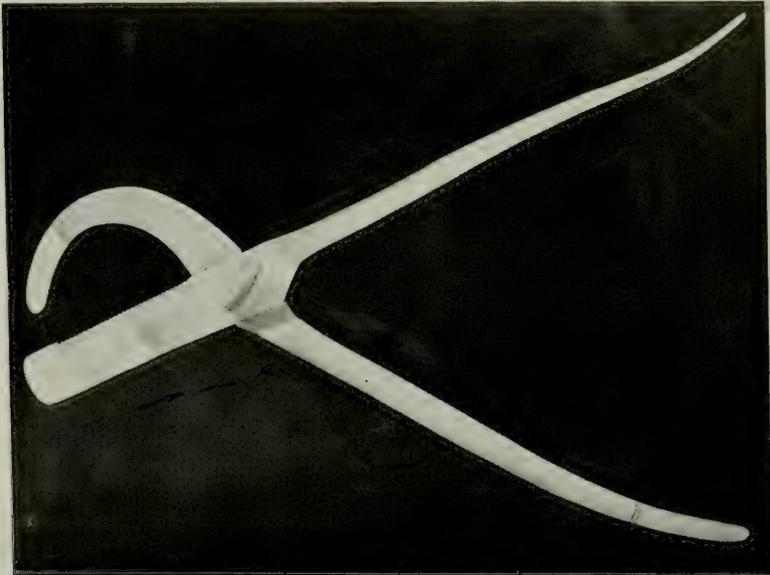


Fig. 5—A safe and satisfactory "single-crimp" emasculator.

is drawn from over the field of operation. In this position, and thus restrained, the largest stallion may be castrated without difficulty.

INSTRUMENTS

1. *Knife*—A properly constructed knife is the first essential instrument required in performing this operation. The Williams all-metal stiff-handle aseptic castrating knife (Fig. 2) is entirely satisfactory for castrating stallions in the recumbent posture.

2. *Emasculator*—The only other instrument necessary is an emasculator for crushing the spermatic cord in such a manner as to assist nature in controlling hemorrhage.

There are many designs of emasculators on the American market; however, many of them are inferior and unsatisfactory, both in design and workmanship. In order for an emasculator to perform the task for which it is intended it must first of all be constructed with straight cutting and

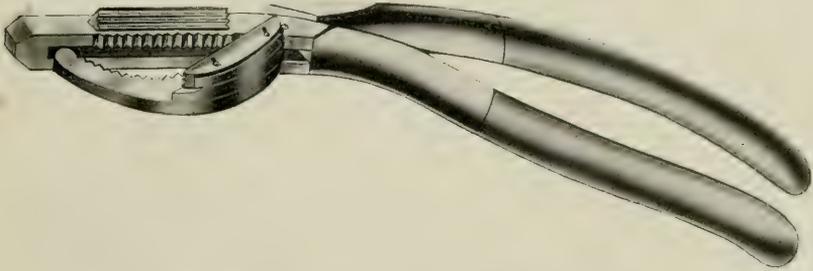


Fig. 6—The Betz triple-crimp emasculator. (Front view.)

straight crimping or crushing edges. (D, C, Fig. 3.) This simply means that the lower or female jaw must be on a straight line. When thus constructed the cord is grasped and crushed before it is severed. Any emasculator made with curved cutting and curved crimping edges (A, B, Fig. 4).

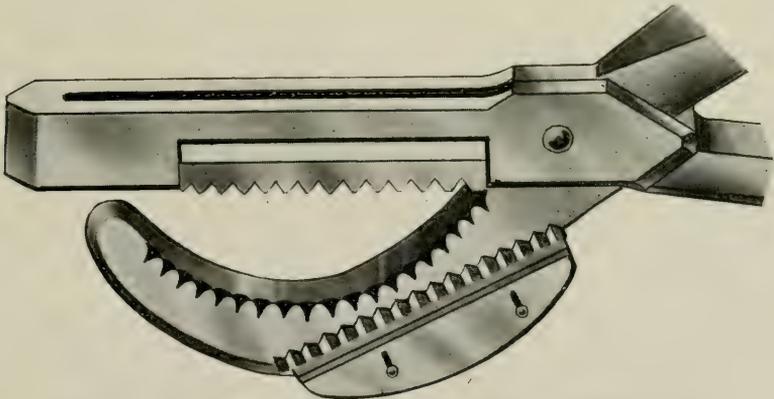


Fig. 7—The Betz triple-crimp emasculator. (Back view.)

which means that the lower or female jaws are curved, is not dependable in controlling hemorrhage, hence is unsafe and unsatisfactory. Fig. 5 illustrates a "single-crimp" emasculator of proper design and good construction.

The triple-crimp emasculator is somewhat safer in controlling hemorrhage than the single-crimp instrument, as the latter crushes the cord in three directions. The author has used a triple-crimp instrument for sev-

eral years with good results. Many of the triple-crimp emasculators now on the market are imperfectly constructed and unsatisfactory in that not enough space has been left between the male (upper) crushing plate and the female (lower) plate—when the instrument is closed—to accommodate the cord of a large stallion.

Figs. 6 and 7 illustrate the Betz triple-crimp emasculator. This instrument is properly designed and well constructed. Of the several different makes of triple-crimp instruments now on the American market, the Betz emasculator is absolutely the only one which the author can conscientiously

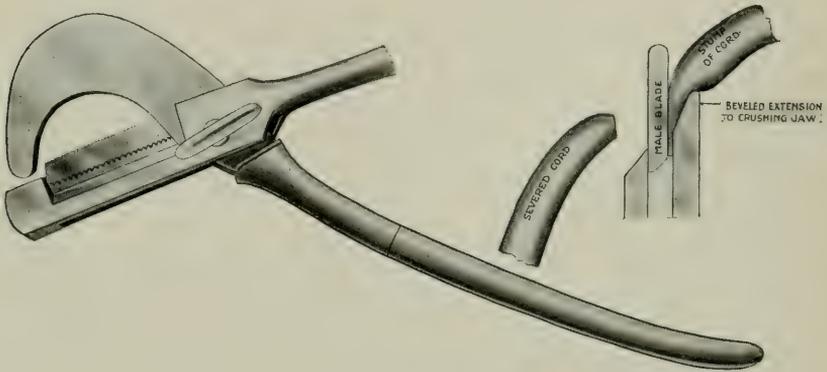


Fig. 8—Dunn's safety emasculator.

tiously indorse and recommend. All the others are defective in some important particular.

The latest improved and possibly the instrument by which the most perfect spermatic cord hemostasis is accomplished—regardless of age and size of the animal—is Dunn's safety emasculator (Fig. 8).

The advantage which this instrument possesses over all others consists of a beveled extension to the crushing (female) jaw. By means of this beveled-extension feature the spermatic cord is drawn into the space between it and the upper blade and gradually compressed before the crushing and cutting is done.

This simply means that when the instrument is closed on the cord, the stump of the cord itself is affected by all degrees of crushing, from barely being touched at the top of the beveled portion of the lower blade to being completely severed—by crushing and cutting—at the lower part of the upper blade.

Handled in this manner the stump of the cord is fairly well sealed so that primary hemorrhage from it will be slight. The *Dunn Safety Emasculator* must be used in order to be properly appreciated.

Anatomy—A comprehensive knowledge of the anatomy of the inguinal and scrotal regions is imperative if a man is ever to be anything like a thrilling success in performing the various necessary operations that are to be described later. However, on account of the limited space at my disposal it will be impossible to go into minute detail here. For complete and detailed anatomical description the reader is respectfully referred to Sisson's, Chauréau's, McFadyéan's, and Strangeways' textbooks on veterinary anatomy.

Scrotum—This is a sac or bag made up externally of a layer of skin which has been continued from the sheath, abdomen and flanks. This skin is smooth, soft and hairless compared with the other portions of the integument. The scrotum consists of two parts divided by a longitudinal raphe (median line). Below the skin is the dartos which forms the scrotal tunic proper, and consists of thin elastic tissue and muscle. The dartos is a continuation of the abdominal fascia. Under the dartos is the spermatic fascia which is a continuation of the external oblique muscle. This muscle is attached to the external abdominal ring. Inside is the cremasteric fascia, an expansion of the cremaster muscle which passes through the inguinal canal over the cord and surrounds the testicle. Deeper we have the funnel-shaped infundibuliform fascia which originates at the internal abdominal ring. This fascia is simply a sheath over the testicle, the cord and their tunics.

Inguinal Canal—This canal is situated obliquely between the crural arch and the internal oblique muscle. The arch forms its posterior, and the muscle its anterior wall. It is compressed laterally, and through it pass the spermatic cord and the pudic artery. Its external orifice is termed the external abdominal ring. This ring is oval in shape and its direction is backward and upward. The internal abdominal ring is a small aperture in the abdominal wall and is situated at the uppermost part of the inguinal canal, which is eight to ten inches above the external abdominal ring. The contents of the inguinal canal pass through the internal abdominal ring in making their exit from the abdominal cavity.

Sheath—The sheath is a loose conglomeration of skin extending from the scrotum forward, and contains the free portion of the penis. The anterior loose double fold of the sheath is known as the prepuce or foreskin, which is corrugated to accommodate the penis during erection and protrusion. Opening into the sheath are ducts from the glandulæ odoriferæ which secrete an odorous matter peculiar to the sheath. The sheath is suspended from the abdominal walls by suspensory ligaments.

Spermatic Cord—The testicle is suspended in the scrotum by the spermatic cord which migrates through the inguinal canal from the abdominal cavity to the scrotum. The following structures enter into its formation:

Spermatic veins, spermatic artery, nerves, vas deferens, lymphatics, cremaster muscle and tunica vaginalis. The vas deferens is situated in the posterior part of the cord and is enclosed in a special fold detached from the inner surface of the tunica vaginalis.

Testicle—The testicle is a compound tubular gland, ovoid in form, sus-

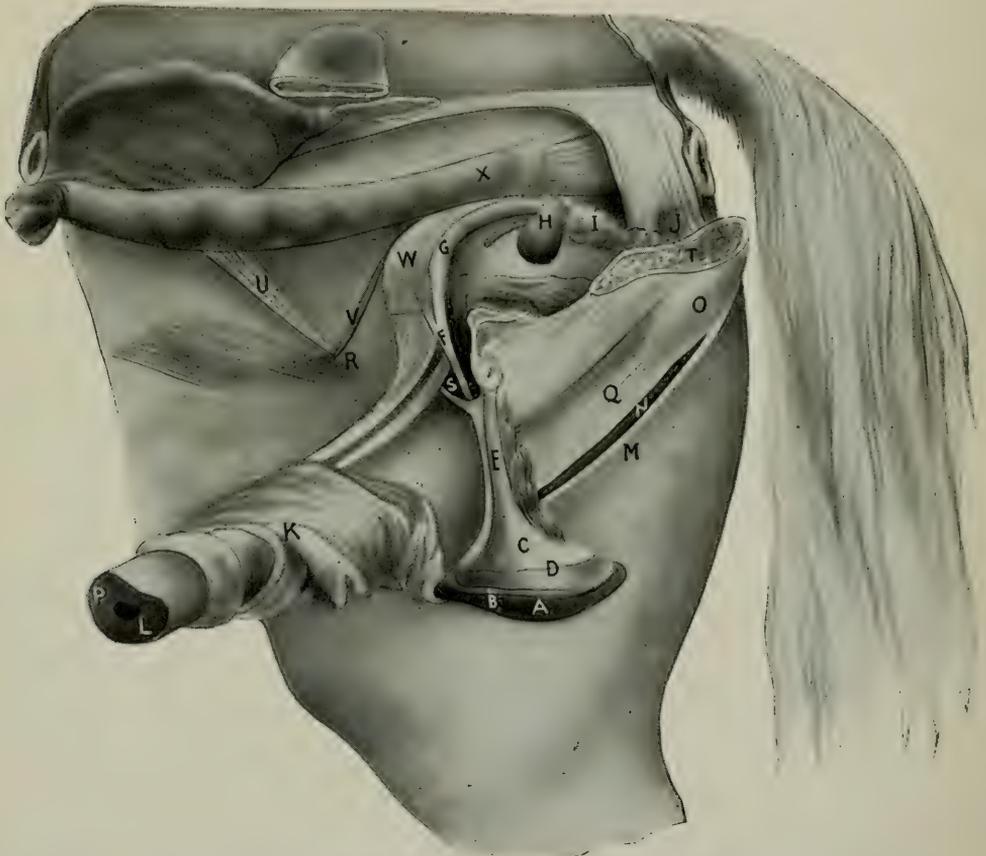


Fig. 9--Internal and external generative organs of the stallion. A, Scrotum; B, skin; C, tunica vaginalis; D, dartos; E, cremaster muscle; F, left vas deferens; G, bulbous portion of vas deferens; H, vesicula seminalis; I, prostate gland; J, Cowper's gland; K, sheath; L, meatus urinarius; M, retractor muscle of penis; N, accelerator muscle surrounding urethra; O, erector penis muscle; P, glans penis; Q, corpus cavernosum; R, right internal abdominal ring; S, left internal abdominal ring; T, symphysis pubis; U, peritoneal fold through which the spermatic blood-vessels and nerves pass; V, right vas deferens; W, bladder; X, rectum.

pended by the spermatic cord and occupying space in the scrotum, inguinal canal or abdominal cavity. When in either the scrotum or the inguinal canal it is contained in a sac known as the tunica vaginalis.

The testicles vary much in size in different subjects and are often of unequal size in the same individual. The epididymis (D, Fig. 10) is an elongated body extending along the upper border of the testes (A). It consists of a body (D), a head or globus major (B), and a tail or globus minor (C).

Vas Deferens—The vas deferens is a firm hard tube which, after leaving the globus minor, ascends the back of the spermatic cord through the ex-



Fig. 10—External view of left testicle and spermatic cord. A, Testes; B, globus major; C, globus minor; D, body of epididymis; E, F, spermatic cord.

ternal abdominal ring, inguinal canal, and internal abdominal ring to the abdominal cavity, where it enters the pelvis, passing to the antero-lateral aspect of the bladder, where it is joined by the duct of the vesicula seminales. This union of ducts takes place in the vicinity of the prostate gland.

NATURE'S METHOD OF CONTROLLING HEMORRHAGE

It is well to always bear in mind that nature is a great factor in controlling arterial hemorrhage. To understand exactly what part nature plays when an artery is severed is knowledge which is never harmful to the surgeon, to say the least. The following occurs as soon as an artery is severed: (1) Contraction of the mouth of the vessel (B, Fig. 11); (2) retraction of the vessel into its sheath (C, Fig. 11); (3) clot formation (D, Fig. 11); (4) syncope.

The function of the emasculator is to assist nature in preventing primary or secondary hemorrhage. This is done by crushing the cord which crimps or closes the spermatic artery, making the field more favorable for clot formation. Never place an emasculator on a cord in any position except at a right angle to the cord (Fig. 12). If the cord is severed at any other angle (Fig. 13) fatal primary hemorrhage is liable to occur.

Warning—Before beginning to operate always carefully examine the animal for inguinal and scrotal hernia (rupture), abnormalities in development, and diseases of the scrotum, testicle and cord. It is also well to look out for constitutional diseases which would have a tendency to endanger the life of the animal or interfere with convalescence. Never castrate an animal if it is affected with strangles, influenza, pleurisy, pneumonia, bronchitis, catarrhal fever, or purpura hemorrhagica. Be careful in casting and tying and above all satisfy yourself that the testicles are actually in the scrotum.

Sterilization of Instruments—If good results are to be attained all instruments should be sterilized by boiling for fifteen to twenty minutes; after boiling, immerse them in a porcelain bowl or granite pan containing one tablespoonful of either Lysol or Liquor Cresolis Compositus (U. S. P.)

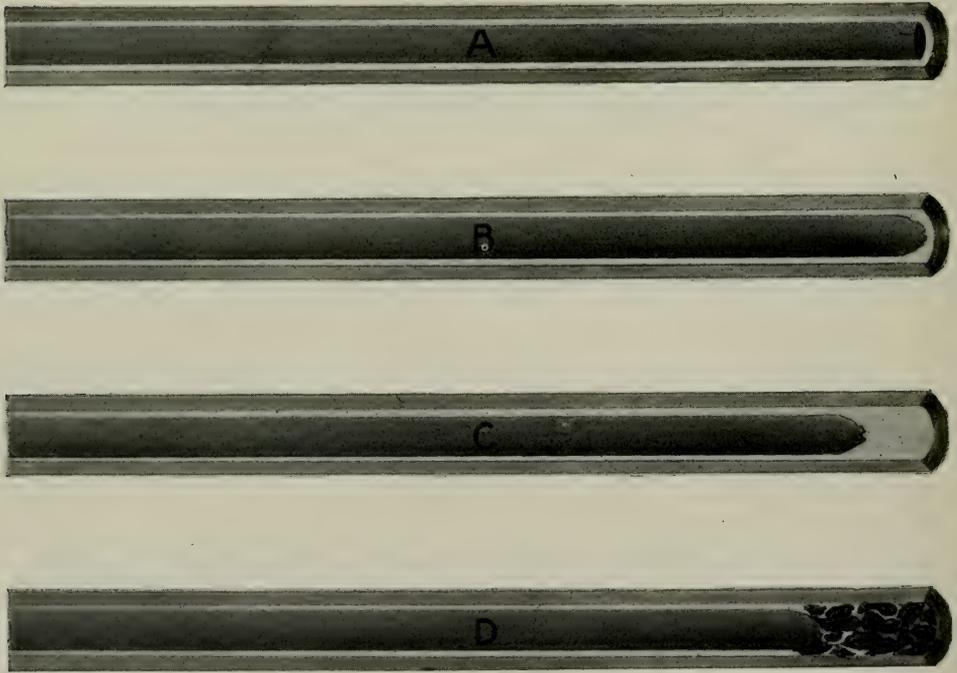


Fig. 11—Diagrammatic illustration showing three of nature's methods of controlling arterial hemorrhage. A, Severed artery; B, contraction; C, retraction; D, clot formation.

to each quart of water. In the absence of the above, carbolic acid in two per cent solution is permissible. Where there are several animals to be operated upon it is not practicable nor is it necessary or desirable to boil the instruments between operations. However, they should be washed and placed back in the antiseptic solution.

Cleansing Operator's Hands—The operator's hands should be thoroughly washed with soap and warm water—using a scrub or nail brush—before beginning castration, and they should be washed in an antiseptic solution between operations. The cleaner the operator is in his work the fewer cases of sepsis he will have to follow.

Operative Technic—After the animal is cast and tied and the instruments and hands of the operator prepared, the field of operation and the surrounding parts should be thoroughly washed with Lysol or Liquor Cresolis (U. S. P.), one tablespoonful to each quart of water. I condemn in the strongest and most emphatic terms washing the sheath at the time of castrating, or undertaking in any manner to cleanse the interior of the sheath. Washing the sheath at or immediately before castration will not only contaminate the field of operation and thereby increase the danger of sepsis, but it invariably encourages the early development of aggravated cases of edema and often times paraphimosis. The sheath should be washed several days before operating or it should be let alone until after the animal has completely recovered.

With the animal, instruments and operator's hands prepared, the scrotal incision is made by grasping with the left hand the scrotum above both testicles, and with two bold strokes of the knife cut through the skin of the scrotum and testicular coverings without hesitation. Expose both testicles to view. The larger the incision the better the results. The incisions should not be less than three and one-half to four inches long and about three-quarters to one inch on each side of the raphe (median line) and parallel to it (Fig. 14).

The testicles are now exposed. Grasp one of them with the left hand, being careful not to touch the cord above where it is to be severed. Place the emasculator on the cord, being careful to see that the crushing side is next to the scrotum. Stretch the cord at right angles to the animal by making from two to three pounds—depending upon the size of the horse—traction on the testicle, at the same time pushing the emasculator well against the body and at right angles to the cord, then close the instrument quickly and firmly until the cord and all its coverings are severed as close to the scrotum as possible. (Fig. 15.)

As soon as the cord is severed, quickly release it and hasten to remove the opposite testicle. It is a useless waste of time and energy to allow the cord to remain in the instrument for several minutes, as some operators advocate. The quicker the cord is released the less the pain and the quicker the blood will clot about the mouth of the artery. By the time the jaws of the emasculator have come together the instrument has done all to the cord that it can possibly do. Why procrastinate in removing it?

By reference to Fig. 16 one may observe the correct position of the emasculator on the cord; also exactly what structures are severed.

The all too common practice of "cord dissection" is also an unnecessary and uncalled for waste of the operator's time and energy, to say nothing

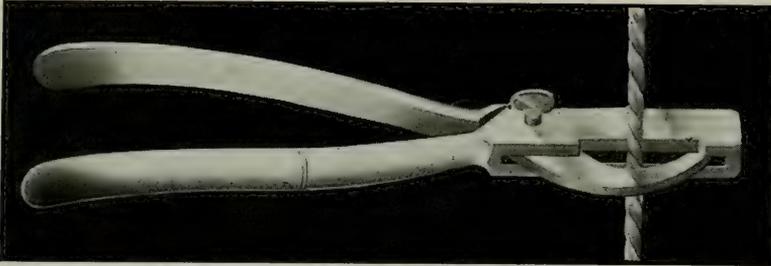


Fig. 12—Correct position of emasculator on the spermatic cord.

of the additional pain inflicted upon the patient as a result of prolonged surgical interference.

After-Care—A small percentage of stallions after castration will become unusually and uncomfortably restless and suffer what appears to be excruciating pain. Sometimes this pain is intra-abdominal and sometimes not. In such cases fluid extract Cannabis Indica should be administered

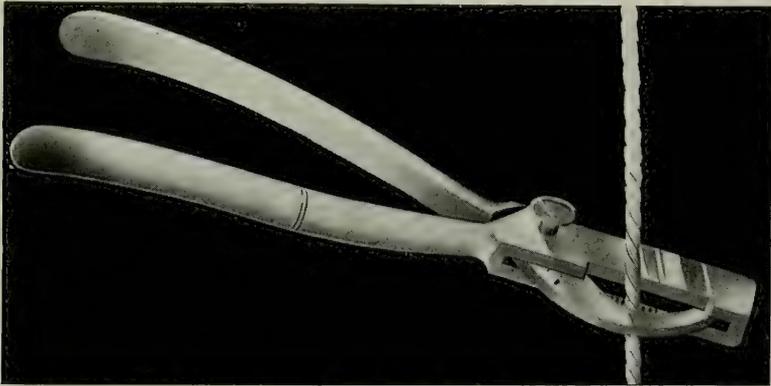


Fig. 13—Incorrect position of emasculator on the spermatic cord.

in ounce doses at two-hour intervals. The animal should be observed frequently for the appearance of secondary hemorrhage and other sequelæ that may arise. The diet should be limited, and plenty of exercise allowed. It is best for the animal to run at pasture during convalescence. Endeavor to keep them away from the stable and barnyard manure. If the lips of the incisions should adhere to the extent of stopping free drainage from the

scrotum, the parts should be thoroughly washed and reopened by forcing one or more clean fingers through the scrotal incisions. In some instances it becomes necessary to "open up" for drainage every two days for six or seven days. However, so long as the wounds are draining this is unnecessary.

After castration it is not necessary to protect stallions, colts and mules from flies, as this class of animals prevent fly contamination of the scrotal wounds by the free and well-directed use of their tails. Even in the midst of "fly time" maggots do not develop in their scrotums.

Contrary to the teachings of some, the author's experience would indi-

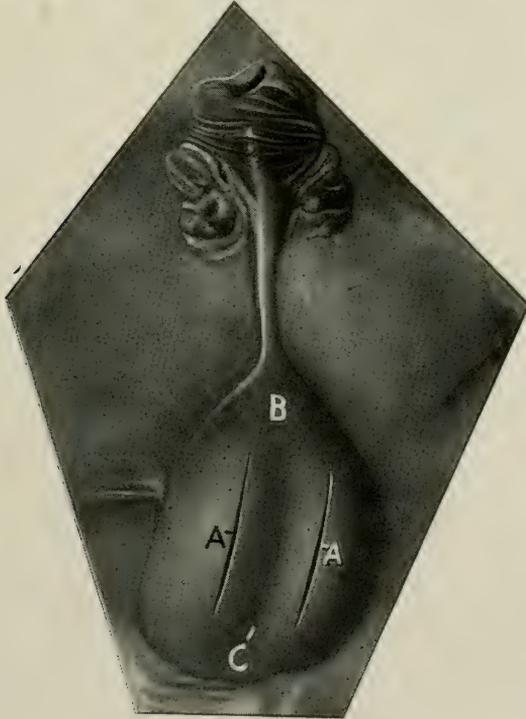


Fig. 14—General external view of scrotum and sheath. AA, incisions $\frac{3}{4}$ inch on each side of median line, 4 inches long and parallel to the line.

cate that warm showers and even heavy rains on animals after castration are not harmful and are to be greatly preferred over allowing the animals to remain in the barn and barnyard in constant danger of wound contamination from manure, dirt, etc.

Treatment of the various sequelæ of castration will be discussed in subsequent pages.

Prognosis—Under parallel conditions and surroundings there appears

to be very little or no more danger in castrating aged stallions than colts. However, on the other hand, when we consider that a large percentage of stallions are affected with cord, serotal, testicular and other diseases which must be taken into consideration in comparing the danger of castrating stallions with that of colts, we are constrained to state that the danger to old stallions far exceeds that to younger animals.

CASTRATION OF THE STALLION IN STANDING POSTURE

Objects and Indications—See page 12.

Age—Any time after the testicle has descended into the serotum, preferably two years old and up to aged stallions.



Fig. 15—Severing spermatic cord with the emasculator. A, left testicle; B, right testicle; C, emasculator applied to the spermatic cord.

Season—See page 13.

Restraint—A well-made and properly applied twitch in the hands of a fearless and physically strong assistant.

Instruments—1. Emasculator. (Figs. 5, 6, 7 and 8.) 2. Knife. It is necessary to have a knife with a sharp point and devoid of “belly” in order that it may be easily thrust into the testicle. Robinson’s castrating knife (Fig. 17) and Williams’ castrating knife (modified) (Fig. 18) are

probably the most satisfactory ones for performing this operation. Robinson's knife is the author's favorite.

The extremely sharp point, short cutting surface and roughened handle of the Robinson knife are its meritorious features. The author's modification of the Williams castrating knife makes it a desirable instrument for castrating in the standing posture. It will be observed, by comparing this

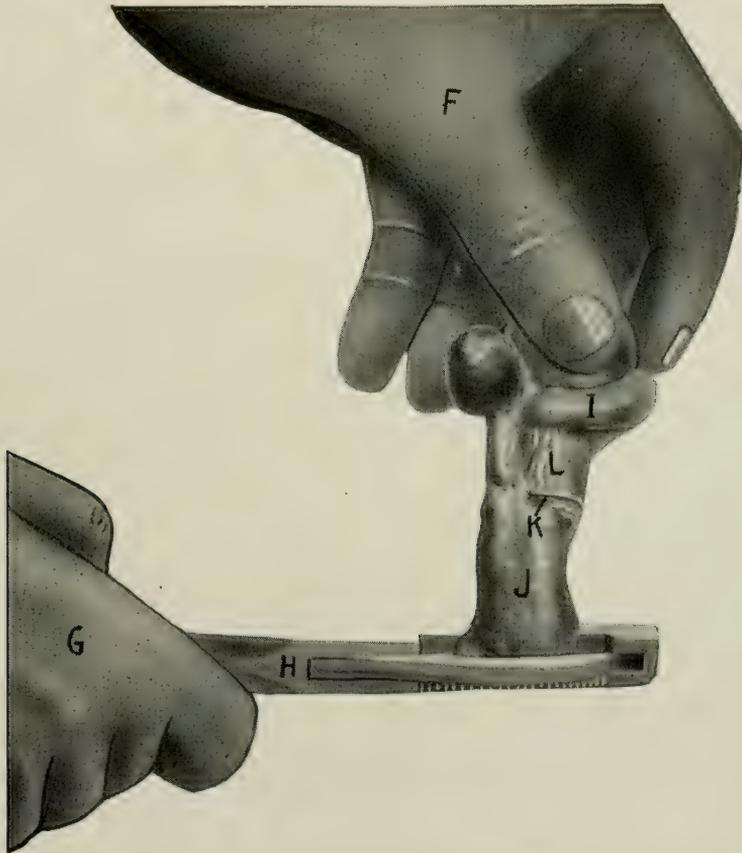


Fig. 16—Spermatic cord and its coverings severed with the emasculator.

I, Body of epididymis; J, tunica vaginalis; K, incised portion of tunica vaginalis retracted on cord; L, spermatic cord.

knife with the original Williams' (Fig. 2), that the "belly" has been ground out and the point sharpened in order to facilitate thrusting it into the testicle.

Anatomy—See page 17.

Warning—Before undertaking to operate take time and precaution to satisfy yourself on the following points:

1. That the animal is not of a disposition or temperament that would contra-indicate operating in the standing posture.
2. That the testicle is actually in the scrotum.
3. That no hernia is present.
4. That the animal is not affected with such local diseases of the scrotum, testicle or cord as would contra-indicate the operation.

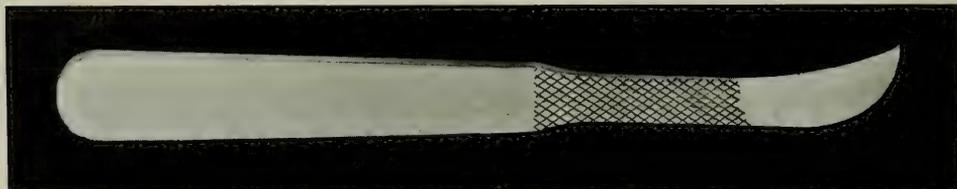


Fig. 17—Robinson's knife.

5. That he is not suffering from any specific constitutional disease which would cause the operation of castration by any method to hazard his life.

6. That you have a dependable—preferably an experienced—assistant in charge of the twitch, and be sure the twitch is a good one.

Sterilization of Instruments and Cleansing Operator's Hands—See pages 20, 21.

Preparation of Patient—At first thought it would be considered proper to disinfect the field of operation by washing with one of the many excellent antiseptic preparations. However, experience and close observation



Fig. 18—Williams' castrating knife (modified).

lead me to state that the advisability and practicability of undertaking the disinfection of the field of operation at this particular juncture—after the twitch is applied—is, to say the least, debatable. Aseptic or even antiseptic surgery would suggest it, but the author is willing to chance running the gauntlet of criticism by going on record as opposing disinfection of the operative field. His only reason for so doing is simply because of the fact that if a man is to do a satisfactory and successful operation with the animal in the standing posture, it is imperative that the operation begin as soon as the twitch is applied and end at the earliest possible moment,

otherwise the twitch as an implement of subjection is not a success and, of course, the violent struggles and efforts to escape on the part of the animal would make the operation a failure. I realize that in making the above statement I run counter to some eminent authorities, but since I have never yet seen a single successful operator on stallions in the standing posture who procrastinated to the extent of disinfecting the field of operation immediately prior to operating, I am ready and willing to suffer



Fig. 19—Side view showing position of patient and operator castrating in the standing posture.

the consequences. Such procedure is not practicable, neither is it necessary or even desirable. If the operator's hands are clean and his instruments sterile, there is not nearly the danger of septic infection from the unwashed scrotum that there is from a bunglesome and imperfect operation on account of struggles on the part of the animal occasioned by delay in beginning and finishing the operation.

Operative Technique—With the twitch applied and the animal forced into the corner of a box stall or fence, the operator approaches from the left side—if he be right-handed—at the same time instructing the assistant, who

is holding the twitch, to at all hazards keep the animal forced well back into the corner. The operator stands slightly out of range of a kick, with his head and shoulders firmly pressed into the left flank of the animal (Fig. 19).

With the left hand grasp the scrotum firmly above both testicles, at the same time do not underestimate the strength of the cremaster muscles.

Expect to keep your scrotal grasp regardless of the maneuvers or antics

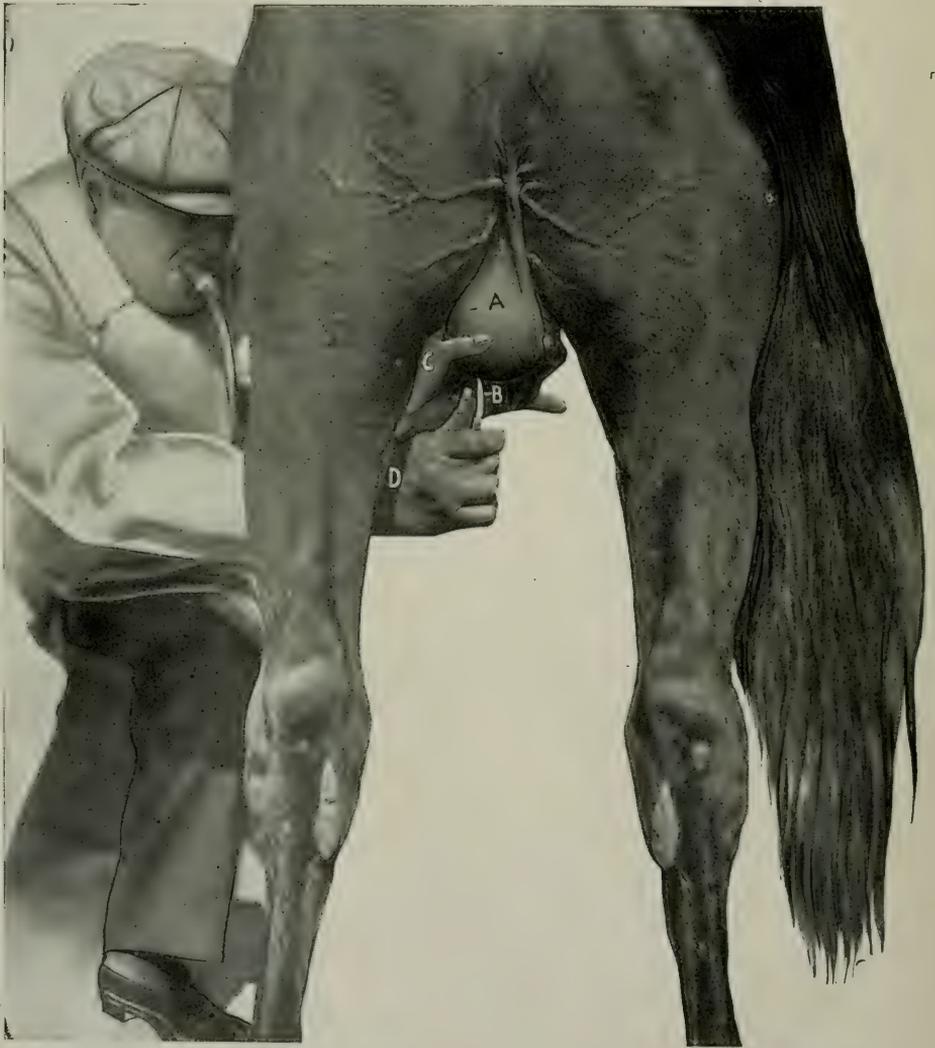


Fig. 20—Posterior view of stallion while undergoing castration in standing posture.
A. Scrotum B. knife.

of the animal. Since you have already agreed with your assistants to hold the scrotum as long as he holds the twitch you are in honor bound to do so, and by so doing you will come out victorious in nineteen out of twenty attempts. With the knife in the right hand, select a point well forward on the scrotum, then quickly jab the knife point into the testes to the depth of about one inch; now with a quick, bold sweep of the knife backward make a slash sufficiently large to expose the testicle, or a more explanatory term would be, "drop" the testicle from the scrotum. Before releasing your hold on the scrotum, the opposite testicle should in like manner be dropped from it. The two slashes should be made about one inch to the right and one inch to the left of the median line and parallel to it. You now grasp with your left hand either of the testicles and make downward traction on the spermatic cord, varying from one to five pounds, depending upon the age and size of the animal. Then with the emasculator—which is handed to you by a second assistant, or better still, carried in a specially constructed pocket in your union-alls—sever the spermatic cord as high in the inguinal canal as possible, after which remove the opposite testicle in the same manner and release the animal.

If you have been dexterous and have not "loafed on your job" you have consumed the whole of six to ten seconds' time. However, if you have been engaged as long as fifteen or twenty seconds you need have no remorse of conscience, as oftentimes it takes—what otherwise would be considered a fairly good veterinary surgeon—as long as twenty minutes to finally succeed, after much effort and a great fight, in removing both testicles from a stallion in the standing posture, and some, even after graduation and many years' experience in practice, cannot do it at all.

Prognosis, Care and Treatment—See page 23.

Sequelae—See under proper heading in subsequent pages.

Advantages of Operating in Standing Posture—(1) Conservation of time and energy on the part of the operator, as it is possible for an experienced and dexterous operator to castrate a stallion in the standing position in six to fifteen seconds' time, provided the animal behaves well. Whereas in the recumbent posture it requires from six to fifteen minutes to cast, tie and castrate. It is much easier on the operator to castrate in the standing posture, as less work and exertion are required.

(2) Safety and comfort to the patient, since the danger of casting and tying is obviated and the animal is not exerted or "heated up" to the extent he would be were he cast, tied and castrated in the recumbent posture.

(3) By castrating in the standing posture—provided it is done with dexterity—the surgeon makes a favorable and lasting impression upon his client, an impression which will not wear off.

(4) Since the operator is not called upon to handle dirty ropes, etc., immediately before operating and the operative field itself is not on or in close proximity to the manure and dirt—as is the case in the recumbent position—less wound contamination takes place.

Disadvantages—(1) Danger to the operator has been heralded to the four winds as an argument against castrating stallions in the standing posture. The author's twenty-five years' experience with operating in both the standing and recumbent postures leads him to believe, in fact know, that the danger to the operator has been highly colored and much exaggerated with reference to castrating in the standing posture, unless the operating surgeon be a novice or an extremely awkward and careless person. Of course it could not reasonably be expected that everyone can, even by time and practice, become an adept at such an undertaking. In order to be a success it is necessary for the operator to possess a level head, steady nerve, plenty of self-confidence, and more than average courage, together with a reserve of physical strength and activity. He should retain his equilibrium in spite of any untoward accident or emergency which



Fig. 21—Side view with animal in standing posture showing positions of right hand, knife, left hand and scrotum prior to making the incisions. Observe that the knife is thrust into the testicle well forward on the scrotum. The incision is made by a single sweep of the knife backward.

may chance to occur. Good judgment is never amiss at any stage of the operation.

The author has never been kicked or injured in any way while castrating stallions in the standing posture. He cannot say as much regarding his experience in operating in the recumbent posture, for many is the kick he has received while applying the hobble straps, and a few while releasing the animal.

(2) The difficulty of securing the testicles has been urged against the standing operation. Such embarrassment is never encountered if the testicle has descended into the scrotum, and the mere fact of the testicle not being in the scrotum is a contra-indication for operating in the standing posture. By all means and at all hazards cast this class of animals and castrate them in the recumbent posture.

(3) Prolapse of the bowel or mesentery from the scrotal incision on account of previously existing serotal or inguinal hernia. A careful manual examination of the serotal region prior to operating will obviate such embarrassment to the operator and danger to the patient. If you decide to operate in the standing posture make it a routine practice to examine the scrotum prior to operation.

(4) Impossibility of operating upon many wild and vicious animals. We must admit that not all animals can be castrated in the standing posture, and foolish indeed would be the surgeon who would undertake such a hazardous and impossible task. When you encounter an intractable animal, have no hesitancy in casting and operating in the recumbent posture. Do not attempt the dangerous, the impracticable or the impossible. Exercise a little good judgment here as well as elsewhere in the daily affairs of life.

CHAPTER II.

CASTRATION OF THE COLT

Definition—What is here meant by castration of colts is unsexing male animals of the equine species less than twenty months of age.

Objects and Indications—Same as for the stallion. (See page 12.)

Age—The testicle does not usually descend into the scrotum to a noticeable degree until the colt is at least eight or ten months old. From the standpoint of danger the earlier the operation the safer. From the stand-

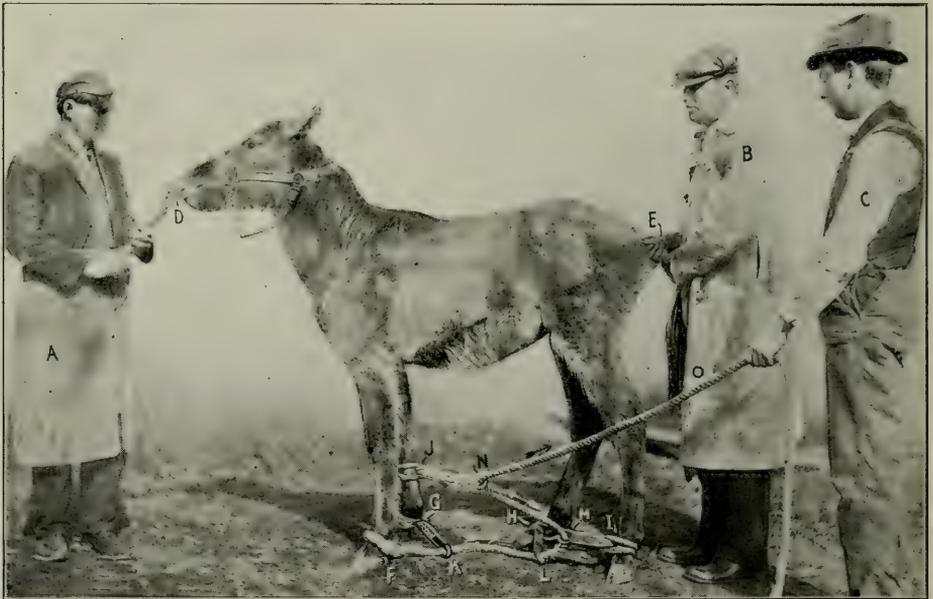


Fig. 22—Miles' colt hobbles applied—First position.

point of development and symmetry it is not well to operate too early. Viewing the problem from every angle, the preferable age at which to castrate a colt is ten to twelve months. However, it may be done earlier or later.

Season—Spring and early fall are the seasons of choice.

Preparation—Same as for the stallion. (See page 13.)

Restraint—Since colts should usually be castrated in the recumbent pos-

ture—primarily on account of the uncertainty of the descent of the testicle into the scrotum—it is necessary to cast and tie them. Of all the casting harness and hobbles used for this class of operation there is no doubt but that the Miles colt hobbles possess many advantages over all others. Hence the Miles method of casting colts is recommended and will be described.

“Farmer” Miles’ Method of Casting a Colt—Fig. 22 represents the Miles colt hobbles applied (first position). Miles’ hobbles consist of four loop hobbles and a main rope. The material used in making the



Fig. 23—Miles' colt hobbles—Second position.

loops may be either rawhide (plaited), leather, or rope. These hobbles are each from fifteen to eighteen inches long and are applied by looping. The main rope is a three-fourths inch cotton rope, eighteen feet long. Upon one end of the main rope is a two-inch metal “D.” This main rope is also used as the master hobble. It will be observed that there is one hobble rope on each hind pastern and two hobble ropes on the off fore leg—one around the pastern and the other just below the

knee. The main rope is applied around the pastern of the near fore leg (F). It is now passed across through the hobble ring on the off fore pastern (K), then backward to the off hind pastern (L), thence across to the near hind pastern (M), and back to the hobble ring (N) below the off knee. The object of this arrangement of the ropes (two hobbles on the off fore leg) is so that when traction is made on the free end of the main rope (O) the off fore foot is raised or lifted off the ground. This in itself unbalances an animal and puts it at a decided disadvantage, besides by



Fig. 24—Miles' colt hobbles—Third position.

lifting the off fore foot the animal will go down on the shoulder of that side and will in all probability receive an easy fall. The animal is cast as illustrated in Fig. 23 (second position), and secured by taking two or more half hitches with the main rope around the uppermost hind pastern. This is done by an assistant. The operator stands opposite the assistant and behind the animal and is handed the main rope (W) by the assistant, after it has been fixed about the upper hind pastern. The rope is carried over the loins and under the colt, thence to the lower hind pastern. Now by rolling the colt on his back (Fig. 24, third position) and making downward pressure on the off hind foot with the left hand, at the same time

drawing the rope tight by an upward pull with the right hand, the hocks are flexed and all four feet brought down close to the abdomen. The rope is now fixed by two half hitches around the right hind pastern.

The Miles method affords a light, portable, strong, convenient, safe, and in every respect an efficient and satisfactory means of castrating and securing the colt. The colt is held balanced in the dorsal position by an assistant on each side, in which position the field of operation is accessible and extremely convenient, and so long as the colt is balanced on his back he is absolutely helpless.

Instruments—(1) Emasculator: same as for the stallion (Figs. 5, 6, 7, and 8). (2) Knife: The knife recommended for colt castration is "Farmer" Miles' hooked knife (Fig. 25).

Many hooked knives of improper design and inferior construction are on the market; on this account it is well for the reader to know the exact essentials of a properly designed hooked knife. The main essential is that the cutting surface of the blade be at an angle of 45 degrees to the



Fig. 25—"Farmer" Miles' all-metal stiff handle hooked castrating knife.

handle and that the cutting surface be sharp up to the handle. It is necessary that the blade cut, not tear. With a blade thus constructed good work can be done. The blades with a decided hook are never satisfactory. Such knives drag or tear through the tissues instead of cutting. Avoid them. To the beginner a hooked knife is awkward to handle; however, after some practice he usually finds it to be an indispensable instrument.

Anatomy—Same as for the stallion. (See pages 17-19.)

Warning—Same as for the stallion. (See pages 25-26.)

Sterilization of Instruments and Cleansing Operator's Hands—Same as for the stallion. (See page 20.)

Operative Technic—With the colt cast and tied and balanced on his back (dorsal position) by one or more assistants (Fig. 26), the scrotum, hands of the operator, etc., disinfected, all is ready for the operation.

Proceed as follows: With the left hand (9) grasp the sheath (10) and with forward and upward traction stretch the scrotum, making it taut. With the knife (15) in the right hand (16) begin the left incision (11-12) well forward on the scrotum (10) and extending backward

three and one-half to four inches. The right incision (13-14) is made likewise. These incisions should be parallel to each other, three-fourths inch on each side of the raphe or median line and parallel to it.



Fig. 26—Castrating the colt. 10, Scrotum; 11, beginning of left scrotal incision; 12, end of left scrotal incision; 13, beginning of right scrotal incision; 14, end of right scrotal incision; 15, knife.

The object of drawing the scrotum upward is to form a cavity between the skin and subcutaneous connective tissue of the scrotum above and the scrotal plexus of the veins below. This cavity or space protects the scrotal plexus of the veins from being nicked by the point of the knife

while the incisions are being made. Release the hold on the sheath and grasp each testicle in turn, and with a nick of the knife open the tunica vaginalis and allow the testicles to escape.

The next step is to grasp the left testicle (18, Fig. 27) with the left



Fig. 27—Castrating the colt. 18, Testicle; 19, spermatic cord; 20, tunica vaginalis; 21, scrotum; 22, emasculator.

hand (17) and draw the testicle upward—at direct right angles to the animal—at the same time exerting from one to two pounds traction on the cord. With the right hand (23) apply the emasculator (22) to the cord (19) and force the instrument well down against the scrotum (21)

in such a manner as to sever the spermatic cord and all of its coverings as close to the skin incision as possible. The right testicle is removed in like manner and the animal released. By reference to Fig. 16, page 25, the reader may observe the exact position of the emasculator on the cord and what structures are severed in operating.

After-Care and Treatment—Same as for the stallion. (See page 22.)

Prognosis—(See page 23.)

CHAPTER III.

CASTRATION OF THE MULE

Objects and Indications—Since the mule is a hybrid, hence valueless for service as a breeding animal, it falls to his lot to undergo the castration operation without exception. Unless the mule is castrated before the age of two years—it becomes exceedingly disagreeable and troublesome



Fig. 28—Castrating the mule. N, Scrotum; O P, scrotal incision; Q, knife; S, raphe or median line.

among other classes of live stock and oftentimes vicious and dangerous to the owner. Apparently the only object in castrating the mule is to cause its sexual desire to permanently subside to the extent of making it a useful farm animal.

Age—Yearlings, never later unless unavoidable.

Season—Preferably spring.

Preparation—Same as for the stallion. (See page 13.)

Restraint—Same as for the colt. (See page 32.)

Instruments—Same as for the colt. (See page 35.)

Anatomy—Same as for the stallion. (See page 17.)

Warning—Same as for the stallion. (See page 20.)



Fig. 29—Castrating the mule. U, Testicle; V, spermatic cord; W, tunica vaginalis; X, scrotum; Z, emasculator.

Sterilization of Instruments and Cleansing Operator's Hands—Same as for stallion. (See pages 20, 21.)

Operative Technic—The operative technic in mule castration resembles in most respects that of colt castration, as outlined on pages 32-38. The only material difference being the manner in which the coverings of the spermatic cord are severed and the extent of their removal.

With the mule cast, tied and balanced on his back—Dorsal position (Fig. 27)—he is ready for operation. The scrotal region and hands of the operator are washed with Lysol or liquor Cresolis (U. S. P.), one

tablespoonful to the quart of water. With the left hand (M) grasp the sheath (N) and with forward and upward traction stretch the scrotum until it is taut. With a knife (Q) in the right hand (R) make the two scrotal incisions (O, P) beginning well forward (O) and extending backward (P) three to four inches. These incisions should be three-fourths inch from and parallel to the raphe or median line (S). Release the hold on the sheath and grasp each testicle in turn and with a nick of the knife open the tunica vaginalis and allow the testicles to escape.

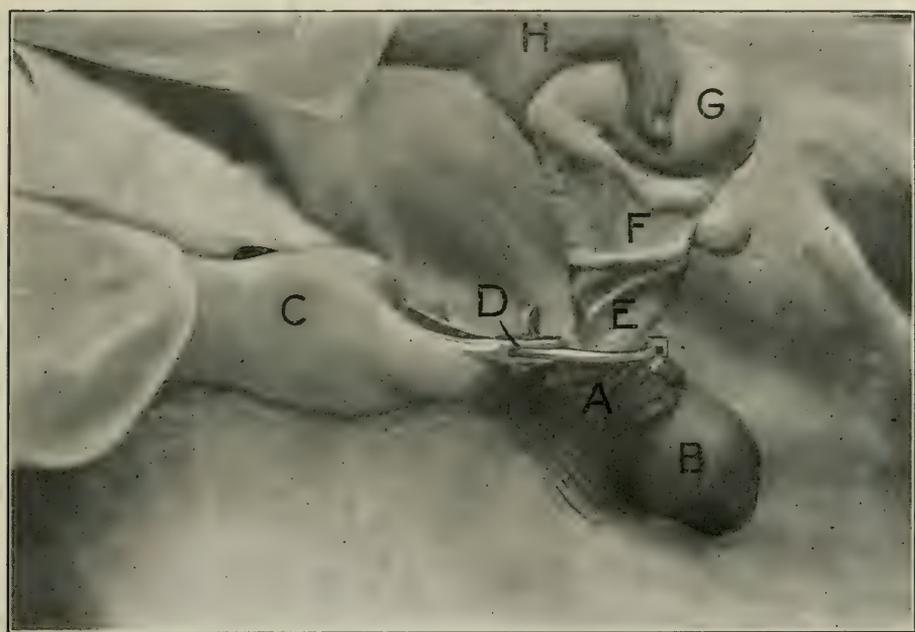


Fig. 30—Proper position of the emasculator, D, and relation of testicle, G, spermatic cord, F, tunica vaginalis, E, and scrotum, A B, in mule castration.

After the testicles are released from the tunica vaginalis one of them is grasped with the left hand (T) (Fig. 29) and drawn upward at right angles to the body of the animal by making from one to two pounds traction on the cord. With the right hand (Y) apply the emasculator (Z) to the cord and force the instrument downward against the scrotum (X) in such a manner as to sever the spermatic cord and all of its coverings as close to the skin incision as possible. See to it that not less than one inch of the tunica vaginalis is cut off in order to avoid that all too frequent sequel of mule castration, viz.: hydrocele ("water bag" or "water seed"), a condition invariably produced by severing the cord

below—with the mule in the standing posture—the tunica vaginalis. The opposite testicle is removed in like manner and the animal released. Figs. 30 and 31 are worthy of careful study by those who contemplate castrating mules. They graphically and plainly illustrate all the important essentials in handling the emasculator in such a manner as to avoid hydrocele formation.

Prognosis, After-Care and Treatment—Same as for the stallion and colts. (See page 23.)

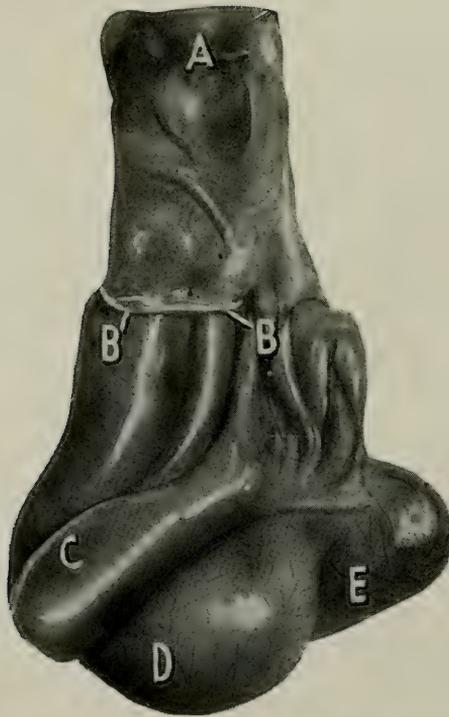


Fig. 31—Testicle of mule after removal. A, Tunica vaginalis covering spermatic cord; B B, incised portion of tunica vaginalis deflected on cord. It will be observed that at least one inch of this tunic has been removed. C, Epididymis; D, Testes.

CHAPTER IV.

COMPLICATIONS ENCOUNTERED IN CASTRATION.

Inguinal and Scrotal Hernia (Rupture).

Definition—Inguinal hernia is a condition in which a loop of the intestine and sometimes of the mesentery migrates or protrudes through the internal abdominal ring into the inguinal canal. (Fig. 32.)

Scrotal hernia is a condition in which a loop of the intestine and sometimes of the mesentery migrates or protrudes through the internal abdom-

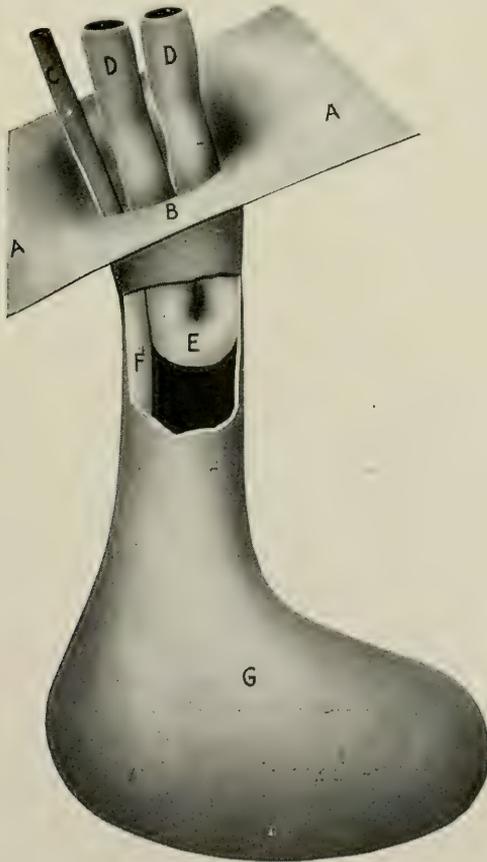


Fig. 32—Inguinal hernia (rupture). A A, Internal abdominal wall; B, internal abdominal ring; C, spermatic cord; D D, intestine; E, loop of intestine in the inguinal canal; F, spermatic cord in the canal; G, scrotum.

inal ring, inguinal canal and the external abdominal ring into the scrotum. (Fig. 33.)

All scrotal hernias were originally inguinal hernias.

Diagnosis—The presence or absence of hernia is determined by carefully feeling the scrotum and closely scrutinizing its size and shape. It is

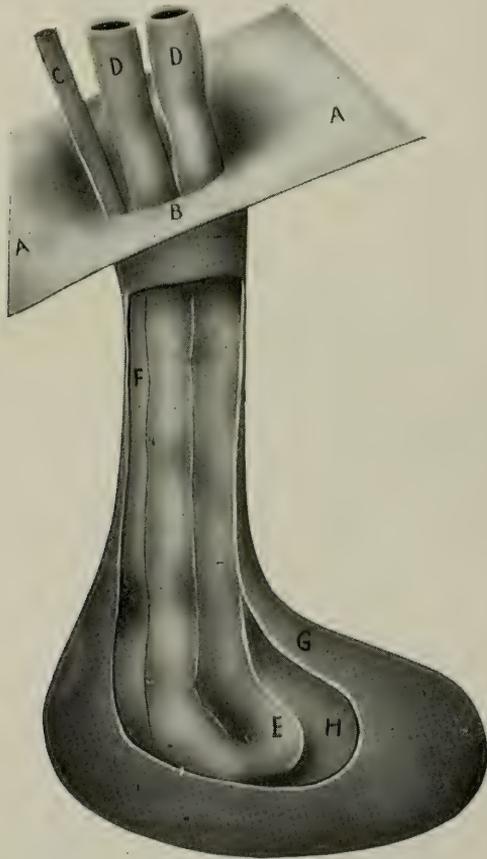


Fig. 33—Scrotal hernia (rupture). A, A, Internal abdominal wall; B, internal abdominal ring; C, spermatic cord; D, D, intestine; E, loop of intestine in the scrotum; F, spermatic cord in inguinal canal; G, scrotum; H, testicle.

oftentimes—in fact usually—impossible to diagnose inguinal hernia except on postmortem examination.

Indications for Operation—The mere fact that the presence of hernia has been determined is sufficient indication for operation, unless there be a good reason for postponing surgical interference until a later date. In all instances the operation necessitates sacrifice of the testicle; hence the

ideal time to operate is at the time of castration. If the surgeon is aware of the presence of hernia and is prepared for the operation, the reduction of the hernia by surgical interference is comparatively easy. However, if the reverse be true—no knowledge of its existence and non-preparedness—in the classical vernacular of the barnyard he is up against the real thing, a situation most of us have been caught in to our chagrin and sorrow.

So long as hernia does not interfere with the health and usefulness of a stallion in service it may not be advisable to operate.

The ideal age to operate is eight to twelve months. Oftentimes scrotal

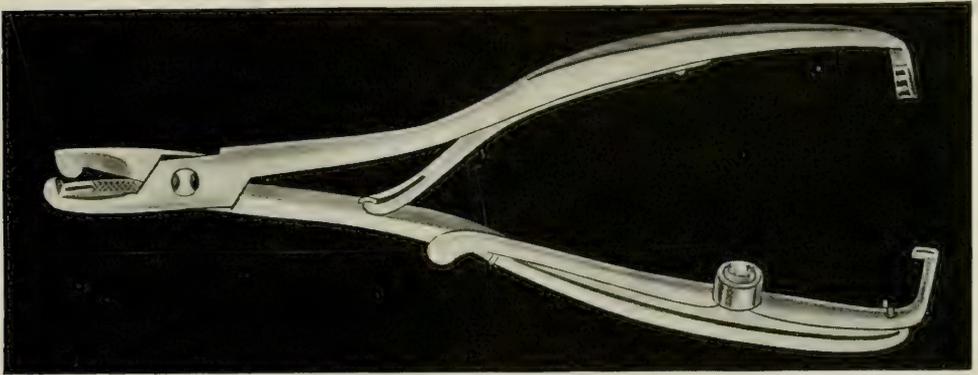


Fig. 34—Richter's needle-holder.

hernias in "sucklings" disappear spontaneously before the animal is a year old.

Restraint—The animal should be cast and tied, and placed in the dorsal position. For colts the ordinary "Farmer" Miles' method of casting (Figs. 22, 23 and 24,) is ideal. For older animals more secure restraint is necessary, such as is secured with the Knowles Casting Harness, described and illustrated on page 51.

Instruments—(1) Emasculator, Figs. 5, 6, 7 and 8. (2) Miles' hooked knife, Fig. 25. (3) Curved probe pointed bistoury. (4) Medium size curved needle. (5) Chromicized catgut (fourteen day) largest size. (6) Needle-holder (Richter's), Fig. 34. (7) Small trocar and canula. (8) Curved scissors (six-inch), Fig. 35. (9) Hemostatic forceps.

Preparation—Empty the intestinal tract by withholding food for twenty-four to thirty hours. If constipated, oil in sufficient amount to purge several days before operating.

Sterilization of Instruments and Cleansing of Operator's Hands—See pages 20, 21.

Operative Technic—Cleanse and disinfect the field of operation by

washing with Lysol or Cresol Compound (U. S. P.), one tablespoonful to each quart of water. With Miles' hooked knife cautiously make an incision in the scrotum, being careful not to open the tunica vaginalis. The scrotal incision should begin well forward and extend backward for five to six inches parallel to the median line and one to one and a half inches from it.

The sac (tunica vaginalis) containing the testicle should then be isolated or detached by blunt dissection and tearing up the inguinal canal to within about two inches of the internal abdominal ring.

Before proceeding further all blood-vessels of sufficient size should be ligated. The sac (tunica vaginalis) should then be opened and the testicle taken hold of and held with one hand while the loop of intestine (J) is gradually replaced through the internal inguinal ring (P) (See Fig. 36) into the abdominal cavity. The testicle itself is now removed with the

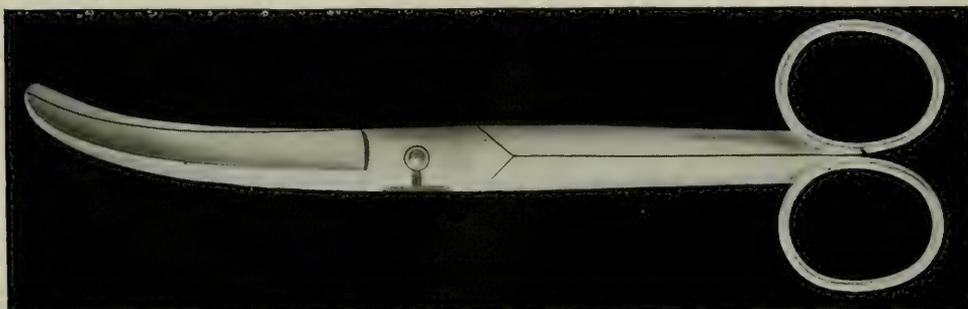


Fig. 35—Curved scissors (6-inch).

emasculator in the usual way. The stump of the spermatic cord (K) is placed within the abdominal cavity and the tunica vaginalis (L) ligated with chromicized catgut (fourteen-day) largest size (M) as close to the internal abdominal ring as possible. The loose portion of the tunica vaginalis is then removed by severing below the ligature. Sometimes it becomes necessary to enlarge the internal abdominal ring before the hernia can be reduced. This can be done readily with a probe pointed bistoury passed up the inguinal canal. If a loop of bowel happens to be distended by gas it should be punctured with a small trocar and canula.

The scrotum may be packed with sterile gauze if considered advisable. However, scrotum packing is not usually necessary.

After-Care and Treatment—Same as for the stallion. (See page 22.)

CASTRATION OF THE CRYPTORCHID (RIDGLING)

Definition—A cryptorchid is an animal in which the testicles have failed

to descend into the scrotum. When both testicles are retained in the abdominal cavity the animal is usually spoken of as a "double cryptorchid."

A monorchid is an animal which has only one testicle. Animals in which only one testicle has failed to descend into the scrotum are frequently spoken of as monorchids. However true monorchids (Except as a result of the removal of one testicle) are rare.

Classification—Since the degree of descent of the testicle varies in

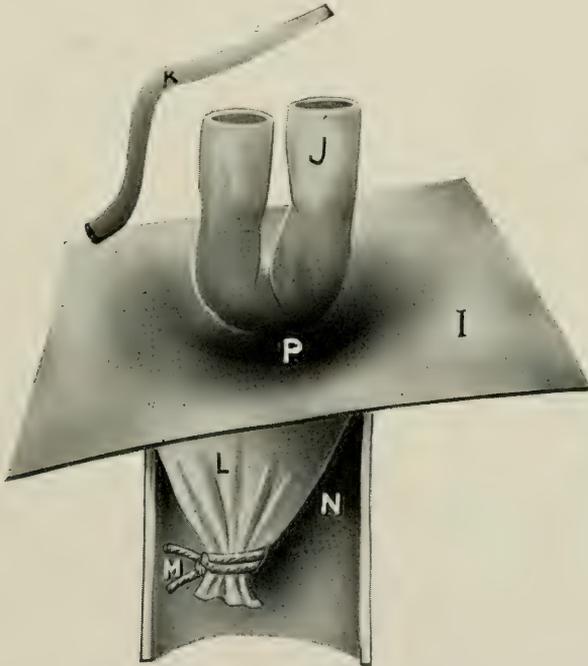


Fig. 36—Diagrammatic sketch of operation for inguinal and scrotal hernia (rupture). I, Internal abdominal wall; J, loop of intestine replaced in the abdominal cavity; K, stump of spermatic cord from which the testicle has been removed; L, tunica vaginalis in close proximity to the internal abdominal ring; M, ligature; N, inguinal canal; P, internal abdominal ring.

different animals it becomes necessary to classify ridglings into at least three groups or classes. They were formerly classified by "Farmer" Miles as:

No. 1. Testicles not in the scrotum but in the inguinal canal. Such testicles can be felt on deep pressure. ("Low flanker.")

No. 2. Testicles high up in the inguinal canal—too high to be felt even upon deep pressure. ("High flanker.")

No. 3. Testicles inside the abdominal cavity,

No. 4. Testicles inside the abdominal cavity with part of the spermatic cord and sometimes the epididymis protruded through the internal abdominal ring into the inguinal canal.

No. 5 Pathological (diseased) testicles.

While the above classification by Miles is not what may be termed anatomically and surgically scientific, it was nevertheless valuable in arriving at the exact status of a ridgling case. While acknowledging the value of the work done by my first teacher—"Farmer" Miles—and the usefulness of his classification of ridgling horses into Nos. 1, 2, 3, 4, and 5, nevertheless such classification was crude, and in this day of progress and development would not pass muster from a scientific viewpoint. The anatomical classification possesses many advantages and will be adhered to in handling the subject.

Miles' No. 1 cannot properly be classed as a cryptorchid in any respect.

(a) *Suprascrotal ridgling* is a condition in which the testicle with the spermatic cord is in the inguinal canal, but too high to be felt even on deep pressure. ("High flanker.") This is the class oftenest encountered in young animals and corresponds with Miles' No. 2. The testicle is usually firm and fairly well developed and always enclosed in the tunica vaginalis.

(b) *Intra-abdominal ridgling* is a condition in which the testicles are located inside the abdominal cavity. This is a genuine cryptorchid in fact as well as in name. In such cases the testicles are usually soft and flabby and not of the characteristic shape met with in stallions. This variety corresponds to Miles' No. 3.

(c) *Intra-inguinal ridgling* is a condition in which the testes is inside the abdominal cavity with a portion of the spermatic cord and sometimes the epididymis high up in the inguinal canal. (Fig. 50). This corresponds with Miles' No. 4. Such cases are usually very confusing to the operator; especially if the operator be a novice.

(d) *Anomalous ridgling* is a condition wherein abnormally developed or diseased testicles are encountered, viz.: hypertrophy, cysts—including dermoid and dentigerous—solid fleshy tumors (sarcocele), atrophy and adhesions of the testicle to the parietal peritoneum, etc. Some of the above enumerated anomalies and curiosities encountered in cryptorchid castration complicate the operative technic and have a tendency to cause the operator no little anxiety, annoyance and oftentimes embarrassment. If further information is desired on cases of this character the author takes pleasure in referring the reader to Frederick Hobday, F. R. C. V. S., London, England, as being the world's best authority.

Objects and Indications—All ridglings should be castrated for the

principal reason that they are sterile as breeding animals and a public and private nuisance among other classes of live stock. Some of them become vicious, in which event they are dangerous both to the owner and to other animals. The fact that the testicle is inside the abdominal cavity, is small, undeveloped and sterile, does not reduce the sexual desire of its possessor in the least. On the other hand, it appears at times that the sexual desire is abnormal. A horse with an undescended testicle is as undesirable as a mare affected with nymphomania. They are useless as service or breeding animals. There is no reason why they should not be castrated and every reason why they should be.

Diagnosis—If possible, secure an accurate history of the subject, as this is a necessary adjunct to operating satisfactorily and successfully. Ascertain the following:

1. If any previous unsuccessful attempt has been made to operate.
2. If either testicle has been successfully removed. If so, on which side was it located and how long since removal?

The information obtained is not always trustworthy, so the operator is not justified in proceeding with the operation until as an additional precaution he has personally examined the animal carefully.

1. Search the scrotum carefully for the cicatrix (scar) of any former attempted operation. If the operation was performed by either the ecraseur or emasculator—some time previously—no distinct scar may be present.

2. Examine the inguinal canal for the stump of the cord. If the previous operation was performed at an early age the stump of the cord may be atrophied to such an extent that its presence in the canal cannot be determined.

If after questioning the owner or attendant and examining the patient you are still in doubt as to which testicle is undescended, the proper method of procedure would be to invade the left, as four-fifths of all undescended testicles are on the left side. If you should make a mistake and invade the wrong side, proceed at once to turn the patient over and operate on the other side. The diagnostic value of rectal exploration at any time is doubtful. Such examination immediately before operating is bad practice and not justified.

Age—Ordinarily the question of age is not one left to the choice of the operator. He is forced to take them at any age he finds them. It is not well to operate upon a ridgling until he is at least two years old. The ideal age is three years, as at that age the animal is larger and better developed, which, of course, means that there is much more room in the inguinal canal and groin in which to work. Besides, at three years old the abdominal wall is thicker and stronger and there is less liability of

rupturing the internal and external oblique abdominal muscles with the hand. Ridglings at any age above three years are acceptable for operation.

Season—Preferably spring and early fall.

Preparation—The main object to be attained in preparing the patient is to have an unirritated and empty alimentary (intestinal) tract at the time of the operation. This is usually accomplished by withholding food for thirty hours before castration. No purgative should be allowed as an empty bowel irritated by purgative medication is a predisposing cause of dangerous sequelae such as colic, peritonitis, volvulus, etc. An



Fig. 37—Knowles' casting harness applied.

empty alimentary tract is desirable on account of affording less intra-abdominal pressure and lessening the possibility of bowel protrusion through the inguinal canal.

Restraint—There are many kinds and styles of restraint harness and ropes with which a ridgling horse may be satisfactorily cast and tied. The main point to be constantly borne in mind is that first of all the restraint must be safe and secure. The animal must be tied in such a manner that the latitude for movement is minimized as much as possible. The position must also be considered. One of the simplest and most satisfactory casting harness for the castration of ridglings is that of Knowles. The Knowles harness has been used for several years by the author with satisfactory results.

The casting and securing harness illustrated in Fig. 37 was designed by W. F. Knowles. It is made in both large and small sizes. The large size fits horses weighing 900 pounds or more, and the small size fits those of from 400 to 900 pounds.

This apparatus is light, compact, and convenient to carry. When properly used it affords ample restraint for all ordinary purposes. It consists of a flat webbing collar, two main ropes and two hobbles. The collar (B) is in two sections; each section is connected on each side of the horse by heavy double rings, one of which is of special design to afford easy passage of the two main ropes (D, G). The ropes (D, G) are each five-eighths inch in diameter and thirty feet long. One end is securely fastened into the inner ring of the webbing breast collar. Around each

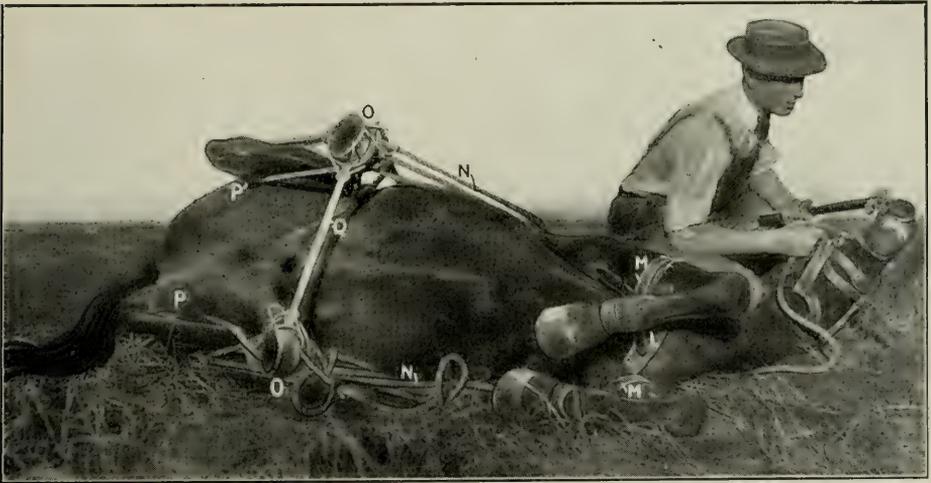


Fig. 38—Animal cast and secured with Knowles' harness.

pastern (E, H) is placed a webbing hobble. In each end of this webbing hobble is fixed a specially constructed metal, rounded "D" through which the ropes pass.

To apply this harness the breast collar is placed over the head and adjusted to the shoulders. One section fits over the withers and the other section is dropped down below the point of the shoulders (K). The free end of the ropes (D, G) pass downward to and through each "D" of the webbing hobble, then upward to and through "D" of the breast collar. If it is desired to cast the horse on the off side, the off fore foot must be raised and secured by some form of knee strap. The free end of the main rope on the near side should be carried backward over the back and held by two assistants. The free end of the main rope (I) on

the off side should be carried forward, well in front of the animal, and held by two assistants. To cast the animal, traction is made on each rope, and at the same time the animal is forced backward a step by the assistant in charge of the head. The head is pulled to the right and the animal is cast on the near side.

In order to securely tie the animal after he is cast (Fig. 38) the main ropes (N, N) are fastened around the pasterns by two half hitches, and are then passed behind the hocks (P, P) in a figure-8 fashion a couple of times, after which they are secured about the pasterns (O, O) by half hitches. The opposite side is secured likewise after the animal is turned over. See to it that the hocks are completely flexed and that the feet are

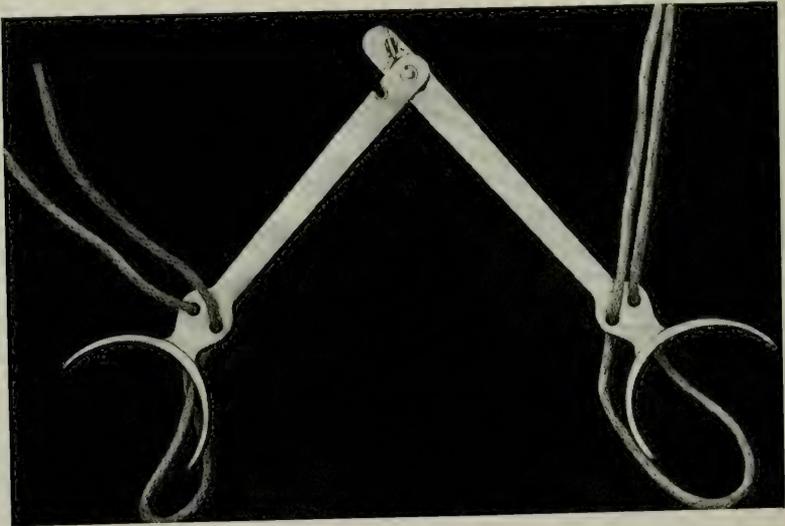


Fig. 39—Miles' ridgling spreaders.

not extended too far forward. After the hind legs are secured apply a knee strap (M) to the off fore leg. The Miles spreaders (Fig. 39) are then applied, after which the animal is secured for operation. The author's ideal, casting harness illustrated on page 218, has been found to be entirely satisfactory for restraining ridgling horses for operation. With this harness the animal is cast and tied by the same methods as those described as being used with the Knowles harness.

While I do not dispute the possibility of castrating a ridgling horse on the operating table, nevertheless its practicability is seriously doubted.

Position—Lateral recumbent position with the side of the undescended testicle uppermost. Hocks completely flexed. Hind feet not too far forward and the thigh completely abducted.

Instruments and Equipment—(1) Miles' all-metal hooked castrating knife (Fig. 25). (2) Peritoneum perforator (Fig. 40).

The peritoneum perforator here referred to is a piece of nickel-plated steel wire sixteen inches long, with a handle on one end and a right angle hook on the other. This hook is one inch in length and its perforating

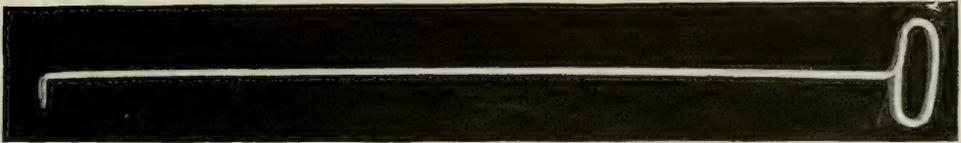


Fig. 40—Peritoneum perforator.

surface is slightly dulled. The function of this instrument—as its name indicates—is to make the opening through the thin abdominal wall.

(3) Ecraseur. The most satisfactory ecraseur yet offered to the veterinary profession in this country is shown in Fig. 41. This instrument is strong, well constructed and its design ideal. The advantages of this instrument over others consist of an arrangement by which, with the thumb and finger of one hand (the other hand left free), the ecraseur can be held, and the slack of the chain taken up at once without drawing out the screw or lengthening the instrument.

The thumb-piece, on the end of which the female thread is cut, works automatically, engaging the screw at all times until released by the

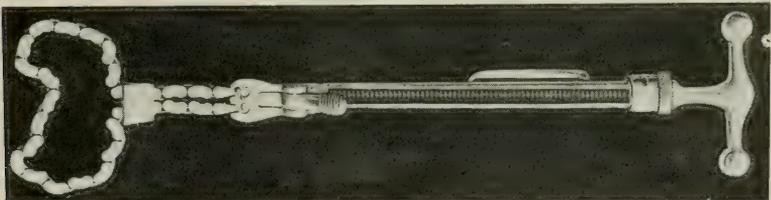


Fig. 41—Dunn's ecraseur.

pressure of the thumb; this insures perfect safety, as the chain cannot slip due to imperfect or careless adjustment, which often occurs with other ecraseurs. It is also easy to clean and sterilize, as it can be taken apart without the aid of a screwdriver in a few seconds' time, by a half turn of the collar near the handle. It is made with or without the improved head. The one with the improved head is much to be preferred.

- (4) Surgeon's needle threaded for suturing the scrotum after packing.
- (5) Sterile gauze to use in packing the scrotum.

(6) Van Horn's or Abbott's Surgical Jelly for lubricating the parts.

(7) Antiseptic solution in plentiful amount. As a precaution against some untoward accident or emergency it is well to fortify yourself by having in reserve the following: (1) Vulsellum forceps (Fig. 55); (2) hemostatic forceps; (3) extra ecraseur; (4) needles containing ligatures and sutures; (5) trocar and canula (ordinary horse size).

Anatomy—Same as for stallion castration. (See page 17.)



Fig. 42—Making the scrotal incision. T, Miles' hooked knife; U, scrotal incision; V, point of sheath.

Warning—Before beginning to operate, diagnose the case if possible. Examine the inguinal and scrotal regions for hernia (rupture), abnormalities in development, diseases of the scrotum, etc. Look out for constitutional diseases which would have a tendency to endanger the life of the animal or interfere with convalescence. These diseases are strangles, influenza, pneumonia, pleurisy, bronchitis, catarrhal fever, purpura hemorrhagica, etc.

Don't thrust your whole hand through the abdominal wall, your index and second finger will do enough damage to the wall and besides these are ample inside the abdomen.



PLATE I

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Cross Section of the Pelvic and Extreme Posterior Portion of the Peritoneal Cavity of a Cryptorchid Horse. Structures Shown have been Embalmed in Situ.

1. Testicle. 2. Tail of epididymis. 3. Fat tissue at posterior end of testicle. 4. Gubernaculum testis. 5. Mesorchium. 6. Urinary bladder. 7. Rectum. 8. Small colon. 9. Mesorectum. 10. Vaginal ring. 11. Plica ductus deferens. 12. Plica ductus vasculosa. 13. Internal spermatic artery and vein. 14. Aorta. 15. Vena cava.



Front-side View of the Pelvic and Extreme Posterior Portion of the Peritoneal Cavity of a Cryptorchid Horse. Structures Shown have been Embalmed in Situ.

1. Testicle. 2. Tail of epididymis (body and head not in view). 3. Fat tissue at posterior end of testicle. 4. Gubernaculum testis. 5. Mesorchium. 6. Small colon. 7. Mesorectum. 8. Site of dorsal part of inguinal canal with peritoneum and subperitoneal basin. 9. Inguinal (Poupart's) ligament. 10. Internal oblique muscle. 11. Small, undeveloped external cremaster muscle. 12. Internal spermatic artery and vein. 13. Aorta. 14. Vena cava.

Don't explore the whole abdominal cavity in an effort to locate the testicle. You wouldn't recognize it if you found it. Better feel for the spermatic cord—something you can recognize if you feel it—which is within two inches of the abdominal incision, provided you puncture the abdominal wall at the right place. Let the testicle take care of itself until later.

Take your time and do the operation well at all hazards.

Be careful in casting and tying, and above all else don't get excited. Remember that it is not you, or even your horse, that is being operated

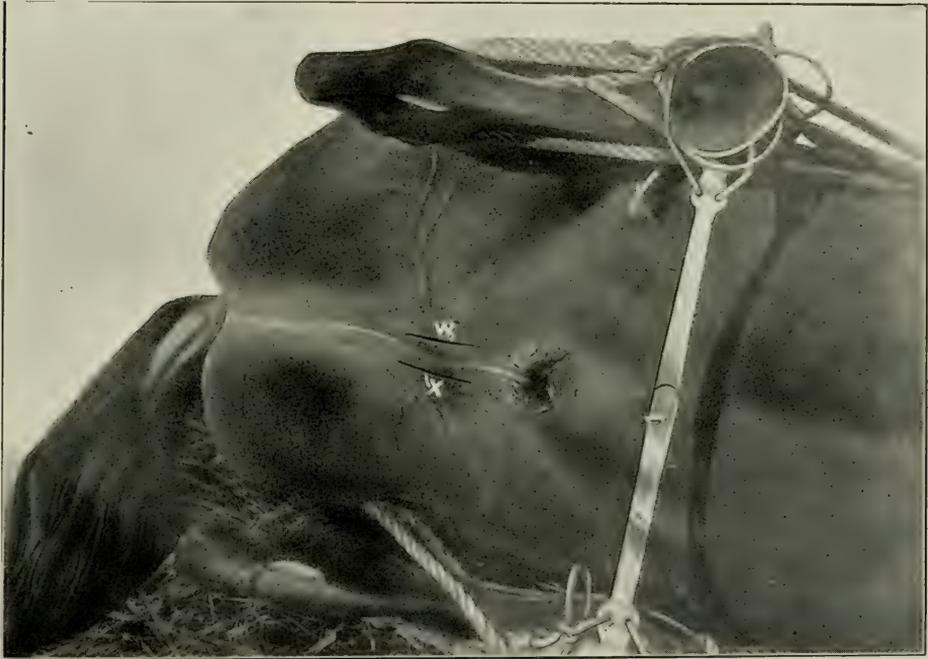


Fig. 43—Scrotal incisions.

upon. If you should happen to make a failure, remember that you are not the only one to whom such a misfortune has befallen.

Sterilization of Instruments—Same as for castration of the stallion. (See pages 20, 21.)

Cleansing and Disinfecting the Field of Operation—Of all the operations in the domain of veterinary surgery where cleanliness stands out prominently as being pre-eminently important it is in ridgling castration. With tincture of green soap, warm water and a scrub brush thoroughly scrub the inguinal and scrotal regions, also the inner aspect of the thighs. After washing, sponge the parts with absolute alcohol. Then paint the

scrotum with tincture of iodine and allow it time to dry before making the incisions.

Operative Technic for Castrating the Intra-Abdominal Ridgling
(Miles' No. 3).

(a) *Scrotal Incision*—With a rubber glove on the left hand (R) and Miles' hooked castrating knife (T) in the right hand (S), the point of the sheath (V) is grasped with the left (R) and traction made upward and forward. (Fig. 42.) Beginning well forward on the scrotum the knife is drawn backward, making an incision (U) through the skin, subcutaneous connective tissue and dartos only. This incision (U) should be five inches long, parallel to and one inch to the side of the raphe or median line. (Figs. 42 and 43.) When the incision or incisions are



Fig. 44—Position of the fingers in opening and entering the inguinal canal.

completed remove the rubber glove from the previously washed left hand and, if necessary, rewash both hands before proceeding further.

(b) *Opening and Entering the Inguinal Canal*—With the four fingers of each hand, placed back to back, separate, by tearing, the tissues down to the external abdominal ring, which is the entrance to the inguinal canal. The next step is to lubricate with Surgical Jelly the scrotal wound and the operating hand. Then proceed, by fixing the fingers in the shape of a cone (Fig. 44) and using a limited amount of force, open and enter the inguinal canal until the internal abdominal ring is reached. Remember the direction of the canal is upward and backward. The internal ring is the landmark for the site of entering the abdominal cavity. You may expect to find the ring at a distance of six to ten inches above the scrotal incision, depending, of course, on the size of the animal.

(c) *Entering Abdominal Cavity from Inguinal Canal*—With the

internal abdominal ring as a guide, select a site one inch above and one inch in front of it, and proceed with a peritoneum perforator to rupture the thin abdominal wall, which at this point consists only of the transversalis fascia and peritoneum, as you are now above the upper border of the internal oblique muscle. This affords access to the abdominal cavity. The perforation should not exceed one inch in length.

(d) *Locating the Spermatic Cord*—With the index and second finger



Fig. 45—Entering the abdominal cavity by perforating the thin abdominal wall. A, Right hand in the inguinal canal; B, peritoneum perforator in action; C, incision; D, left hand manipulating perforator.

enlarge, by stretching, the abdominal perforation sufficiently to admit both fingers (Fig. 46). The cord (C) is almost invariably located within two inches of the abdominal perforation (F). To find the cord, pass the second finger downward against the internal abdominal wall (G) and the index finger directly forward, slightly upward toward the center of the abdominal cavity. By bringing these two fingers together (Fig. 47) the

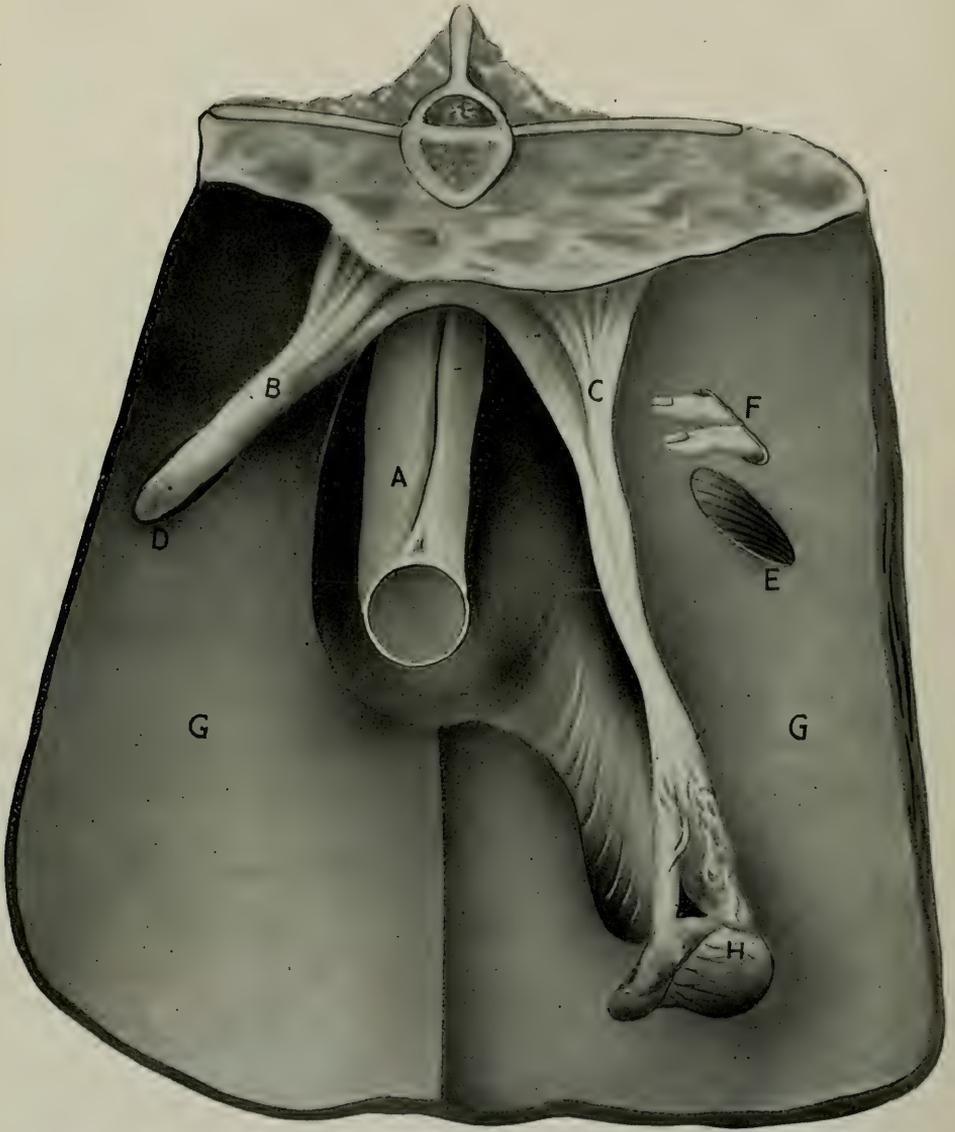


Fig. 46—A diagrammatic illustration showing important facts relative to ridgling castration. This and the next cut illustrate far better than words could describe some of the covered steps of the operation. A, Rectum; B, cord of right descended testicle; C, cord of left undescended testicle; D, right internal abdominal ring; E, left internal abdominal ring; F, incision through the abdominal wall 1 inch above and 1 inch in front of the internal abdominal ring. Observe the index and the second finger protruding through incision searching for the spermatic cord. G, G, internal abdominal walls; H, undescended testicle floating loose in abdominal cavity attached to end of the spermatic cord.

cord (C) is caught between them. To distinguish the cord from the other abdominal viscera it is rubbed between the fingers and the vas deferens—a hard, wire-like cord—is plainly felt. No other vessel in the

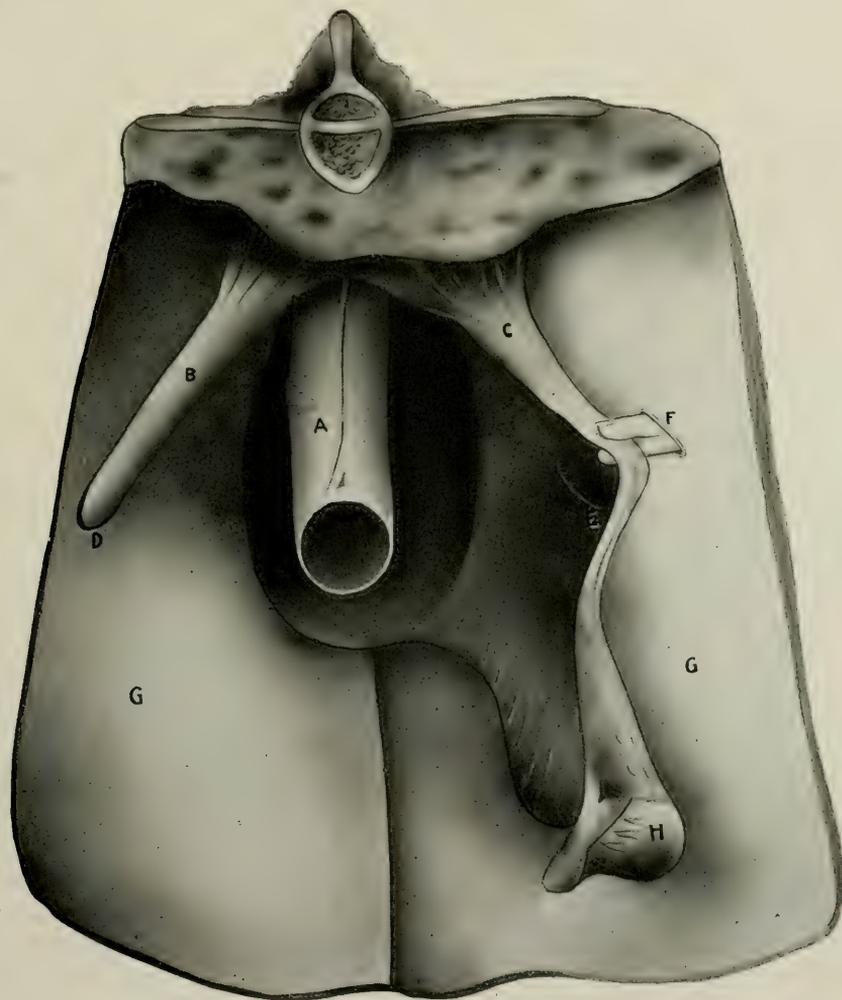


Fig. 47—A, Rectum; B, cord of right descended testicle; C, cord of left undescended testicle; D, right internal abdominal ring; E, left internal abdominal ring; F, abdominal perforation through which is protruded the index and the second finger of the operating hand grasping the cord (C) of the undescended testicle; G, G, internal abdominal wall; H, undescended (left) testicle.

abdominal cavity has this wire-cord-like feel, hence felt between the fingers it is positively identified.

(e) *Removing Testicle From the Abdominal Cavity*—With the cord

(C) between the two fingers, moderate traction is made and the unattached end of the cord containing the testicle will follow through the abdominal perforation (F) into the inguinal canal and out through the scrotal incision.

Removing Testicle From Cord—Grasp the testicle with the left hand, and with the right hand apply the chain of the ecraseur to the cord. With



Fig. 48—Removing the testicle from cord. E, Testicle; F, ecraseur.

two pounds of traction on the cord force the ecraseur chain well up in the scrotum, at right angles to the cord; take up the slack of the chain and proceed to sever the cord.

(f) *Final Step*—Wash the scrotum and surrounding parts with anti-septic solution, being careful to remove all blood clots, etc., after which pack the scrotum only, using one yard of sterile gauze, and suture the

skin incision securely with strong uninterrupted sutures. Packing the scrotum can do no harm, and there is a possibility, in fact a probability, of its saving the life of a patient. Especially is this true should colicky pains ensue within twelve hours after operating, in which event the rolling and tumbling of the animal would have a tendency to cause bowel protrusion. As a precautionary measure I cannot too strongly recommend packing the scrotum before the animal is allowed to rise to his feet.

If only one testicle is undescended remove the other as in ordinary castration and the operation is complete. If the animal is a double cryptorchid, turn it on the other side and repeat the operation on the other side without delay. Never attempt to remove both testicles from the one abdominal opening, as in order to do so it is necessary to enlarge the

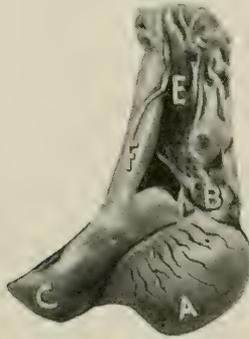


Fig. 49—Testicle of a "ridgling" horse.

opening sufficiently to admit the whole hand; such a large perforation in the abdominal wall is dangerous and such a procedure bad practice.

Intra-Inguinal Ridgling

This is the variety in which the testicle (testes) is inside the abdominal cavity, while a portion of the spermatic cord and sometimes the epididymis is in the upper part of the inguinal canal, of course surrounded by the tunica vaginalis. (Fig. 50.) This corresponds to Miles' No. 4.

This is the class which is liable to confuse the inexperienced operator.

Objects and indications, age, season, preparation, restraint, position, instruments, anatomy, washing, sterilization of instruments, cleansing the operator's hands and disinfection of the operative field are the same as those employed in castrating the intra-abdominal ridgling.

Operative Technic—The incisions are made and the scrotum and inguinal canal invaded in the same manner as that employed in the intra-abdominal variety.

Location of the Testicle—The testicle is located by proceeding carefully

up the inguinal canal, at the same time making a thorough search for the tunica vaginalis containing the spermatic cord and sometimes the epididymis. As soon as the tunic is encountered, examine it carefully in order that no mistake in diagnosis be made. When satisfied that you are in possession of the tunica vaginalis, pass the hooked knife up the canal sufficiently high to nick the tunic and allow its contents—be what they may—to escape into the inguinal canal. You are now in possession of the

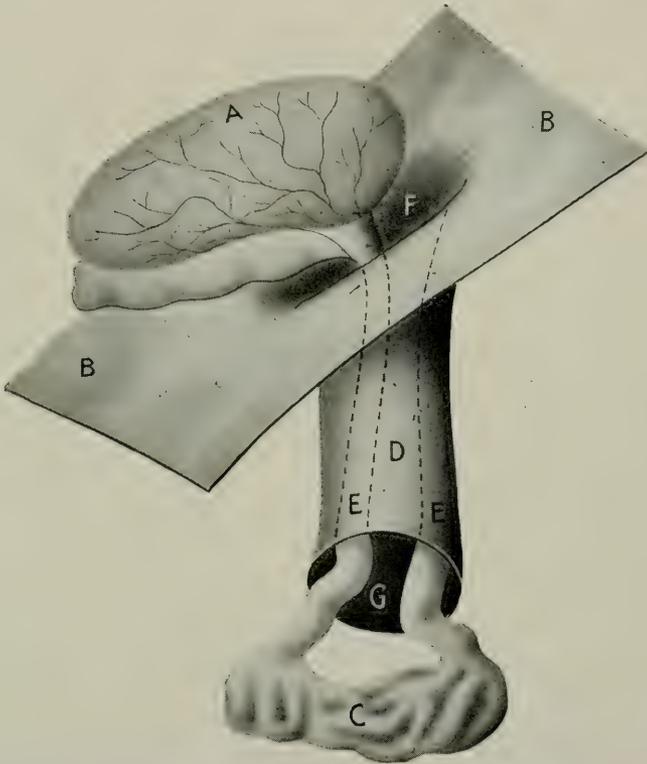


Fig. 50—Intra-inguinal cryptorchid (Bayer). A, Testes inside the abdominal cavity; B, B, internal abdominal wall; C, spermatic cord inside the inguinal canal; D, tunica vaginalis; E E, dotted lines indicate outlines of spermatic cord; F, internal abdominal ring; G, inguinal canal.

spermatic cord and are justified in applying a limited amount of traction in an effort to bring the testicle from the abdominal cavity through the internal abdominal ring into the inguinal canal. If successful, all that remains to be done is to sever the spermatic cord with the ecraseur and allow the animal to rise to his feet. Oftentimes the amount of traction which can safely be applied to the cord will not suffice to bring the testicle

out of the abdominal cavity. The proper method of procedure in such a case is to perforate the abdominal wall with the peritoneum perforator (Fig. 40) one inch above and one inch forward of the internal abdominal ring. With the index and second finger in the abdominal cavity return the cord, and such other parts of it or the testicle as are in the inguinal canal, to the abdominal cavity, after which the cord can easily be brought through the abdominal perforation into the inguinal canal and the testicle is sure to follow. In other words, we make an intra-abdominal ridgling out of the intra-inguinal ridgling and castrate him as described in detail on pages 56-61.

Supra-Scrotal Ridgling—This is the variety in which the testicle and spermatic cord are in the inguinal canal, however, too high up to be felt even on deep pressure ("High flanker"). This class is the one usually encountered in young animals, and corresponds to Miles' No. 2.

Not being in possession of knowledge which would indicate to us in advance that the testicle is not actually in the abdominal cavity, we are forced to proceed accordingly and prepare the patient, sterilize the instruments, cast and tie, disinfect the field of operation, make the scrotal incisions, invade the scrotum and inguinal canal, the same as we would for a ridgling of the intra-abdominal variety. However, encountering the tunica vaginalis containing the testicle high up in the inguinal canal—outside of the abdominal cavity—we are spared the effort, and the animal the danger of perforating the abdominal wall. All that is necessary to be done is to pass the hooked knife up the canal, nick the tunica vaginalis, allow the testicle to escape, sever the cord with the emasculator, and allow the animal to rise to his feet.

Secondary Operation—Oftentimes a previous attempt has been made by an incompetent operator, to remove an undescended testicle. In such cases the scrotum and groin are filled with scar tissue, complicating the entrance to the inguinal canal and the abdominal cavity and otherwise making the operation difficult, unpleasant and unsatisfactory. In such cases the convalescence is prolonged and the mortality greater than if the unsuccessful attempt had not been made. In operating upon this class of cases the scrotum is entered in the usual way, after which the scar tissue in the canal is cut through and broken down until the internal abdominal ring is reached. In doing this it often becomes necessary to control profuse hemorrhage by ligation. When the internal abdominal ring is reached, use it as a landmark and proceed to finish the operation in the usual manner. Such cases are referred to as "repeats."

(d) *Anomalous Ridgling*—This is the variety in which pathological testicles are encountered, and it corresponds to Miles' No. 5. The diseased conditions most often observed are: hypertrophy, cysts—including der-

moid, simple serous, and dentigerous varieties—solid tumors (sarcocele), etc. In operating upon ridglings belonging to this class the same general principles are employed as apply in castrating intra abdominal ridglings, with the exception of the size of the perforation through the abdominal wall and the methods of removing the testicle therefrom. Instead of making a perforation sufficiently large to admit two fingers, it is usually necessary to make one that will admit the whole hand. When cystic testicles are encountered it oftentimes becomes necessary to free them of their fluid contents by the use of the trocar and canula before they can be withdrawn through the abdominal incision. In removing large, solid tumors which are too voluminous to be brought down the inguinal canal, the flank method of operating must be resorted to. The operative technic must be modified step by step as the circumstances and condition met require. The operator must solve the problems as they arise. No fixed *modus operandi* applicable to such pathological conditions can be outlined. It is up to the individual operator, and my advice is to “go to it” and do your best.

After-Care and Treatment—Place the animal in a sanitary, well-bedded box stall immediately after the operation is completed. Halter the head up in such a manner as to prevent him from lying down for twenty-four hours. If severe pain (colicky) ensues one ounce fluid extract *Cannabis Indica* may be given in a capsule at two-hour intervals. Allow plenty of water, but no feed during the first twelve hours. At the expiration of twenty-four hours remove the packing from the scrotum, untie the animal, and if possible turn him out to pasture. Turning out to pasture is advocated for two reasons, viz.: first, for exercise, which is a very essential part of the after-treatment; second, to get the patient away from the dirt and manure around the barnyard and stable, thus avoiding the greatest source of wound contamination.

Moderate daily exercise is essential even if it is necessary to force the patient to take it. Violent exercise is harmful, and is not called for at any stage of the procedure. Usually as soon as the swelling appears and the soreness develops—the very time they need exercise most—there is a tendency on the part of the patient to stand still in one place for hours without moving. In this event, the animal must be led in a walk about a mile morning and night until after the eighth or ninth day. If the lips of the skin wound adhere in such a manner as to interfere with free inguinal and scrotal drainage, the parts and the operator's fingers should be thoroughly washed and the scrotum opened, after which the wound should be irrigated with a dependable antiseptic solution.

Keep the bowels lax by bran mashes and green food.

Sequelae—Septic infection (see page 68). Tetanus (see page 68). Abscess

of scrotum and inguinal canal (see page 68). Colic (see page 70). Prolapse of the intestine (see page 70). Injuries from casting (see page 70). Peritonitis (see page 70). Primary and secondary hemorrhage. (see page 72). Edema of the sheath and ventral surface of the abdomen (see page 73).



Fig. 51—Hermaphrodite horse.

Paraphimosis (see page 75). Azoturia (see page 71). Schirrous cord (see page 77).

Remarks—If the foregoing illustrations and description of the ridgling operations are not plain, then the author must confess that he is incapable of imparting knowledge or information of this character. An extra effort was purposely and honestly made to dispense with much superfluous “stuff,” often termed “information,” widely used by some in describing

the *modus operandi* of ridgling castration. The reader is here assured that the authors' only object was to level the technic to a plain, solid, practical basis in order that this most necessary economic operation could be learned and more generally practiced for the benefit of mankind in general and the horse-raising industry in particular.

ORCHITIS

Orchitis—Both acute and chronic orchitis are not infrequently encountered in the castration operation.

Definition—Inflammation of the testicle.

Symptoms—(a) Acute Orchitis—Swelling of the testicle accompanied by heat and pain on pressure. Arching the loins, stiffness and straddling gait are usually observed.

(b) Chronic Orchitis—Enlargement and hardening of the testicle accompanied by adhesion of that organ to the tunica vaginalis.

Advisability of Castration—(a) Acute Orchitis—When an acute case of orchitis is encountered and its presence recognized before the scrotum is opened, it is always advisable to postpone operation until a later date in order to give the inflammation time to subside.

(b) Chronic Orchitis—There is no special reason why an animal cannot be safely castrated while affected with chronic orchitis, even though the case be an aggravated one. In such event the testicle itself would be quite voluminous in size and completely surrounded by adhesions firmly connecting it to the tunica vaginalis. The method of procedure when such a complication as this is encountered is to proceed as in castrating a stallion in normal condition, with the exception that it will be found necessary to detach the testicle from the tunica vaginalis by tearing and blunt and sharp dissection of the adhesions. Sometimes the hemorrhage from blood-vessels in the tunic is quite profuse and must be controlled by hemostatic forceps and ligatures.

When the adhesions are so strong and dense as to prevent tearing and breaking them down, it becomes necessary to operate by what is known as the "covered method," viz.: Allow the testicle to remain in the tunica vaginalis and sever with emasculator the tunica and cord well above the testicle.

Adhesions—See chronic orchitis above.

HERMAPHRODITE

Definition—Hermaphroditism is a condition in which both sexes are manifested.

Objects and Indications—In those cases of hermaphroditism in which the male genitals are most developed, the animal will have the same habits

and exhibit most of the objectionable qualities observed in the ridgling. In such cases it is oftentimes advisable to undertake the removal of the testicles. In fact, the veterinarian is called upon to perform this operation much oftener than is usually imagined.

Preparation—Same as for castration of the stallion. (See page 13).

Season—Spring and fall.

Age—Same as for castration of the stallion. (See page 13.)

Restraint—Same as for castration of the ridgling.

Anatomy—The general anatomy of the parts is, of course, the same as that of the stallion. (See pages 17.) However the testicles in this class of animals are indefinitely located. There is no hard and fast rule with reference to their location which would be a definite guide in finding them. They are usually outside the abdominal cavity, most frequently in the inguinal canal, but in some instances they are found in the posterior part of the scrotum. Figure 51 illustrates one of the author's cases in which one testicle was high up in the inguinal canal and the other in the scrotum.

Instruments—Same as for castration of the ridgling.

Position—Dorsal.

Sterilization of Instruments and Cleansing Operator's Hands—Same as for castration of the stallion. (See pages 20, 21.)

Operative Technic—With the animal cast and tied, a careful search for the testicles should be made in every conceivable direction and in every logical location. If they can be felt, the operation is greatly simplified. If they are concealed, the proper course to pursue is to open the scrotum and proceed up the inguinal canal as in castrating a ridgling. When found, the testicles should be brought out of the scrotal incision, provided the spermatic cords are not too short to prevent it. If the cords are short, pass the ecraseur up the canals and sever them.

After-Care and Treatment—Same as for the ridgling. (See page 64.)

CHAPTER V.

SEQUELAE OF CASTRATION

Septic Infection

Contamination of the wound either during operation or afterward may result in septicemia, pyemia, peritonitis, tetanus, abscess, etc.

Abscess of Scrotum and Inguinal Canal.—This condition arises as a consequence of septic infection associated with the lips of the skin incision adhering too early after the operation.



Fig. 52—A colt with tetanus 18 days after castration.

Treatment.—Evacuation by lancing in such a site and manner as to afford free drainage, followed by daily irrigation with any reliable anti-septic solution is the extent of the treatment.

TETANUS

(Lock jaw) is the most frequent sequel of castration in the southern

states, and from information at hand I am inclined to believe that this sequela is not rare in other sections of the United States.

Cause—We know that tetanus is caused by the tetanus bacillus gaining access to the wound. This may take place either at the time of operation or later. Whenever a case of tetanus develops after castration the owner invariably censures the operator. However, experience has led me to conclude that the operator is blameless in the great majority of instances. At least ninety per cent of animals that develop tetanus after castration, acquire the infection from lying down in manure and dirt, thus contaminating the wound. In every castration operation there is a possibility of post-operative infection.

Period of Incubation—The period of incubation varies from eight to thirty days.

Symptoms—Stiffness and contraction of all the voluntary muscles, more especially those of the tail and jaws. As a result of this muscular stiffness the tail and head are protruded, the jaws stiff—partial or complete—straddling and awkward gait. When the head is raised the nictitating membrane (haw) protrudes over the eyeball. (Fig. 52.)

Treatment—Is both prophylactic and curative. Prophylactic treatment consists in the administration of 500 to 750 units of tetanus antitoxin immediately after each castration operation.

Curative treatment consists in casting the animal, opening up the scrotal wound and swabbing it out thoroughly with tincture of iodine, after which place him in a quiet box stall away from other live stock and noise and administer one-twentieth to one-tenth grain of lobelin sulphate once daily or often enough to quiet the animal and control the spasms, or one may give thirty grains powdered extract Cannabis Indica three times a day. If treatment with tetanus antitoxin is undertaken, 5,000 to 10,000 units intravenously every two days is indicated. The diet should consist of sloppy foods.

Mortality—The mortality varies from thirty to seventy-five per cent.

PROLAPSE OF THE OMENTUM

While prolapse of the omentum is a rare sequela of castration, nevertheless, it does sometimes occur, and when it does, prompt and heroic measures are imperative if the life of the animal is to be saved. Usually when the omentum protrudes from the scrotal incision it is simply a forerunner of what is to happen later, viz: protrusion of the intestine and death of the animal unless intelligently directed relief measures are promptly instituted.

Operative Technic—Cast and secure the patient in the dorsal position, after which cleanse the parts and the hands of the operator by careful and thorough washing with antiseptic solution. Sever the protruding portion of

the omentum with the emasculator, after which return that portion which remains in the inguinal canal back through the internal abdominal ring into the abdominal cavity. If there is evidence of the internal abdominal ring being abnormally enlarged it is safest, in fact advisable, to gather up the tunica vaginalis and ligate it as near the internal abdominal ring as possible with chromicized catgut (14 day) large size. Proceed the same as for inguinal and scrotal hernia, page 46. If thought advisable there is no special objection to packing the scrotum with sterile gauze and suturing. Remove the sutures and packing in twenty-four to thirty hours and irrigate the canal and scrotum once daily for eight days with Lysol or cresol compound (U. S. P.), one tablespoonful to each quart of water. Daily exercise at pasture or walking exercise is advisable.

PROLAPSE OF INTESTINE

This is another rare though dangerous and annoying sequel of castration, which is always fatal unless treated promptly and properly.

Operative Technic—Same as outlined above for treatment of prolapse of the omentum, with the exception that if the loop of intestine is distended by gas, the gas should be released by using the small trocar and canula. If the internal abdominal ring is contracted or too small to permit the return of the intestinal loop, it becomes necessary to enlarge the ring (kelotomy) by using a probe point bistoury.

INJURIES AS RESULT OF CASTING

It is possible for the animal to receive halter burns, lacerations and abrasions of various kinds. Rupture of the muscles and tendons sometimes occurs. The vertebrae and other bones may become fractured. Some horses present radial paralysis as a sequel of casting, while others become exhausted and never rise after being released. The correct treatment of these conditions must be left to the judgment of the operator. They are mentioned more as a warning to him to exercise care, good judgment, and discretion in manipulating his restraint technic than for any other reason. "Safety first" should be the motto.

COLIC

Post-operative colic characterized by abdominal and scrotal pain, and not infrequently by more or less flatulence, is by no means a rare occurrence, especially in old stallions and cryptorchids.

Treatment—Choral hydrate or fluid extract Cannabis Indica in one ounce doses at two-hour intervals until the pain subsides.

PERITONITIS

Septic infection is the direct cause of peritonitis as a sequela of castration. The infection may be introduced at the time of operation by contami-

nated instruments or the hands of the operator, or it may be of post-operative origin as a result of wound infection from manure and dirt in the barnyard or pasture.

Peritonitis develops more frequently as a sequela of cryptorchid castration than otherwise. It is one of, if not *the* most serious sequela of castration.

Symptoms—Peritonitis as a result of sepsis usually ensues two to five days after operation. Its development is characterized by chilly sensations, indisposition to move about, and in the event of moving there is a well marked stiffness of gait, and soreness. Restlessness, pawing with the fore feet, and striking at the abdomen with the hind feet. Abdomen and flanks tucked up and decidedly rigid. Constipation is usually present, and colicky pains may be shown. Tenderness on pressure to the abdominal wall, is noted, particularly when this pressure is made in the flank region. Elevated temperature (102° to 105° F.), quick breathing, hard and wiry pulse are also present. If death does not ensue in a short time, there is usually an extensive effusion of fluid in the abdominal cavity.

Treatment—Purgatives should never be administered. If necessary to secure bowel movement it is better to resort to, and depend entirely upon enemas. To allay the pain there is nothing better than one ounce fluid extract Indian Cannabis in capsules at intervals of four hours. A mustard plaster applied to the abdominal wall is indicated in the majority of cases.

Prognosis—Unfavorable.

AZOTURIA

This is a disease caused by over-nutrition and lack of bodily exercise, the development of which, as a sequela of castration, is extremely embarrassing, to say the least. Azoturia never develops where daily exercise, either at work or in pasture, is allowed. However, with animals that have been well fed and kept confined in a stall, it is a condition which we may encounter at any time when casting and confining such an animal.

On account of the danger of azoturia it is well to know whether the animal has had sufficient exercise before you undertake to cast and tie it.

Symptoms—After the operation is completed and the restraint apparatus removed the animal may fail to rise to his feet altogether, or upon rising may be stiff in one or more legs—most frequently the hind legs—perspiring freely, evincing pain by pawing; and restlessness. If urine is voided, it has the characteristic “coffee color.” Swelling and rigidity of the muscles of the haunch (gluteus maximus) knuckling in the hind fetlocks, etc., are diagnostic symptoms of this affection.

Prevention—Daily exercise.

Treatment—Catheterization. Stimulating liniments rubbed on the affected muscles. Internally, fluid extract of belladonna one-half ounce, sweet

spirits of nitre one ounce, in capsules, at two-hour intervals. An aloes purge is sometimes beneficial. If the case is a mild one and the animal can stand on its feet it is advisable to tie the head up to prevent lying down.

POST-OPERATIVE HEMORRHAGE—(a) PRIMARY AND (b) SECONDARY

(a) *Primary Hemorrhage*—May ensue immediately after the operation from failure of the emasculator to close the spermatic artery or from the scrotal plexus of veins being severed with the point of the knife at the time the incision is made.

Treatment—Only in extremely rare instances is it necessary to artificially control hemorrhage of this source and character. Nature will, as a rule, relieve the surgeon of such responsibility, provided he will be patient for 20 to 30 minutes and allow her time to do it. It is more often necessary to treat the owner while his animal is bleeding than it is to treat the animal itself. In a quarter of a century's experience, during which more than 14,000 stallions, colts and mules were castrated, not a single animal died as a result of primary hemorrhage, and not a single cord was ligated nor a scrotum packed. If a properly constructed emasculator is used, impose the utmost confidence in it, and do not become unduly alarmed every time a stallion or colt bleeds freely for a few minutes after castration. Remember that it is impossible with the emasculator to do a bloodless operation. If you are expecting a bloodless job you will as a rule be disappointed except in extremely anemic colts. If you are afraid of hemorrhage, remember that the only method of operation in which you do not get more or less blood is the antiquated ligature, clamp and cautery. If a stallion bleeds freely after castration, the best way to proceed is to place him in a box stall, shut the door and go with the owner to dinner. After dinner take a leisurely smoke with the owner—this usually consumes about an hour's time—after which examine the patient and you will find that nature has come to your rescue and the hemorrhage has ceased.

(b) *Secondary Hemorrhage*—This form of hemorrhage invariably ensues from the spermatic artery and contrary to primary hemorrhage is dangerous, and may result in the death of the animal unless controlled. It usually occurs from one to six hours after castration; however, it sometimes occurs several days after the operation. Hemorrhage of this character is usually caused by a diseased condition of the arteries (hemophilia), increased heart action, sloughing of the spermatic cord, etc. The blood comes in spurts directly from the artery in a good sized stream.

Treatment—Nature cannot be depended upon to control this class of hemorrhage. Sometimes it is possible to apply hemostatic forceps to the mouth of the bleeding vessel. When this cannot be done with the animal in the standing posture, cast and secure the patient in a dorsal position,

thoroughly cleanse the parts with antiseptic solution and make an effort to ligate the artery. The ligature used should be chromicized catgut (10 day). If silk or any other form of unabsorbable ligature material is used a serotal fistula is liable to result. In the event it is found impossible to locate and ligate the artery, one would be justified in packing the canal and serotum with sterile gauze and suturing the skin incision. Remove the packing



Fig. 53—A, Edema of sheath fourth day after castration.

in twenty-four hours and irrigate the parts once daily with an antiseptic solution.

EDEMA OF SHEATH AND VENTRAL SURFACE OF ABDOMEN

Edema as a sequela of castration (Fig. 53) is a condition which we may reasonably expect in the great majority of instances, especially may we expect it in aged stallions and those which are kept stabled and not allowed the requisite amount of exercise. Unless the sheath and abdominal swell-

ing is associated with a local or systemic septic infection or it becomes so voluminous as to cause interference with voiding the urine, it is harmless and requires no treatment aside from opening up the wounds for free scrotal drainage, and walking exercise. The swelling begins to appear on the third day and gradually enlarges until the sixth day, after which it begins to recede rapidly until the eighth or ninth day, at which time complete recovery has usually taken place.



Fig. 54—Paraphimosis eight days after castration.

Treatment—When treatment is required, the first thing to be done is to wash the scrotal, inguinal and sheath regions with Lysol or Cresolis Compound (U. S. P.), one tablespoonful to a quart of water. Cleanse the hands in like manner. With the twitch applied and held by an assistant, two fingers are introduced into the scrotal wound, by forcing the lips of the incision apart sufficiently to afford free scrotal and inguinal canal drainage, after which irrigate the parts with antiseptic solution. With a

sharp-pointed bistoury the point of the sheath (anterior portion) may be punctured at several dependent sites in order to allow the accumulated fluid to ooze out. In scarifying the sheath the blade of the knife should be guarded with the thumb to prevent too deep puncturing.

PARAPHIMOSIS

Prolapse of the penis (Fig. 54) may result from extensive inflammation and swelling of the spermatic cords (funiculitis) and extensive edema

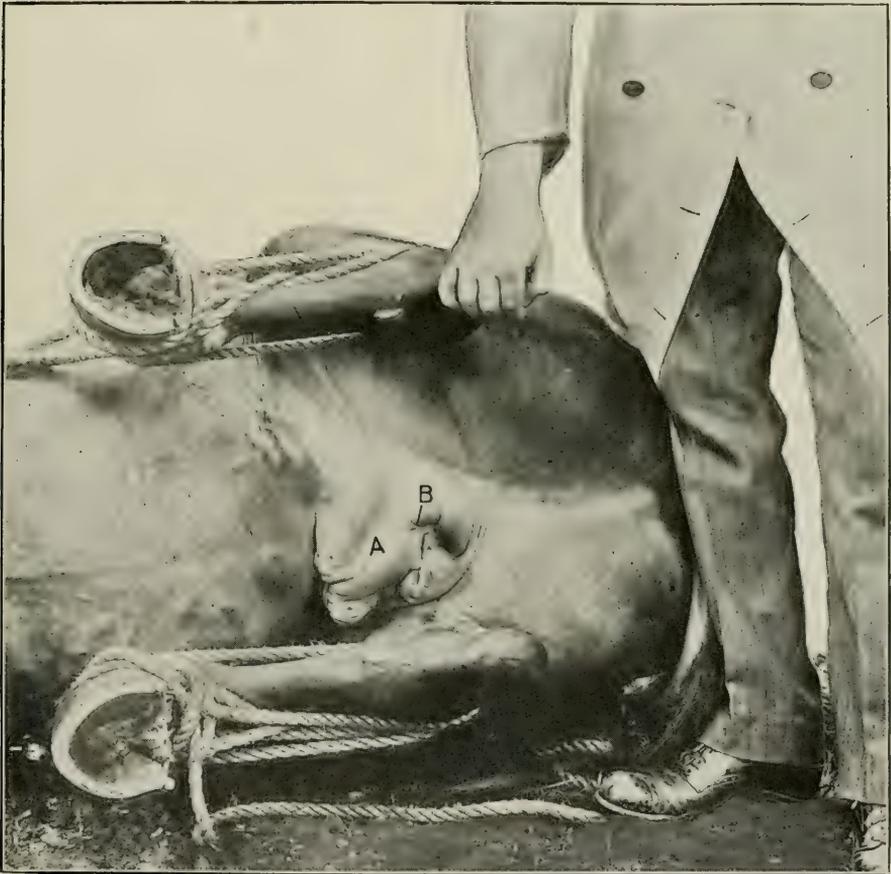


Fig. 55—A well developed schirrous cord.

of the sheath. Generally the penis protrusion is merely a temporary affair, and as soon as the swelling and inflammation of the spermatic cords, sheath and scrotum subside the penis assumes its normal position in the sheath.

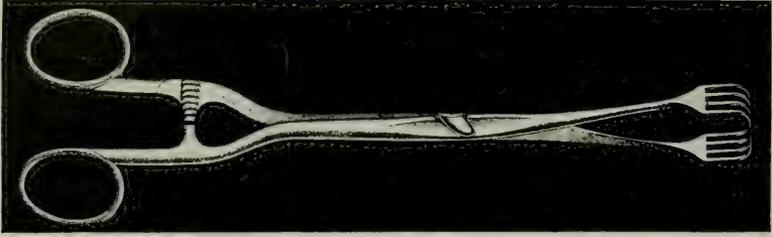


Fig. 56—Vulsellum forceps (8-inch).

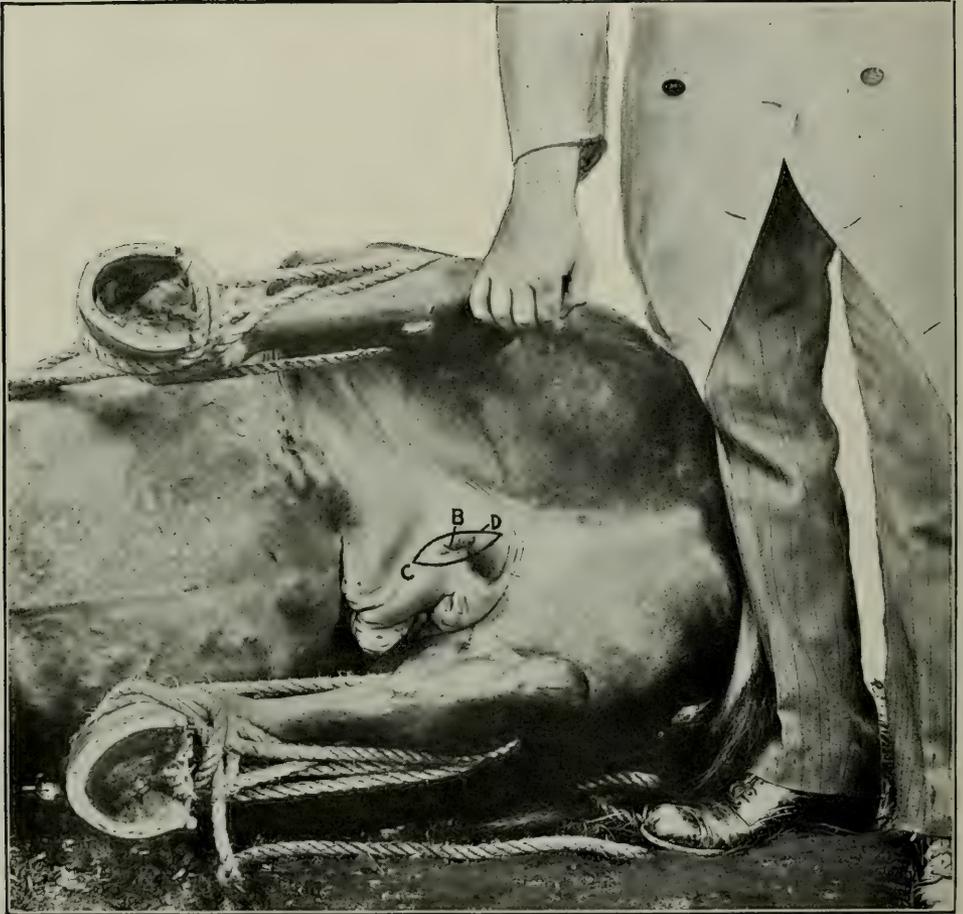


Fig. 57—Schirrous cord, showing skin incision. B, Old cicatrix with imprisoned end of cord; C, scrotum; D, elliptical skin incision for ablating the growth.

Treatment—The first essential is to support the pendulent penis, as its great weight and position are unfavorable for absorption of the fluid and reduction of the swelling. Bathe the swollen parts with plenty of warm water to which has been added sugar of lead (plumbi acetatis), one ounce to the gallon of water. With a properly constructed suspensory, a warm pack saturated with the above solution may be kept applied to the parts.

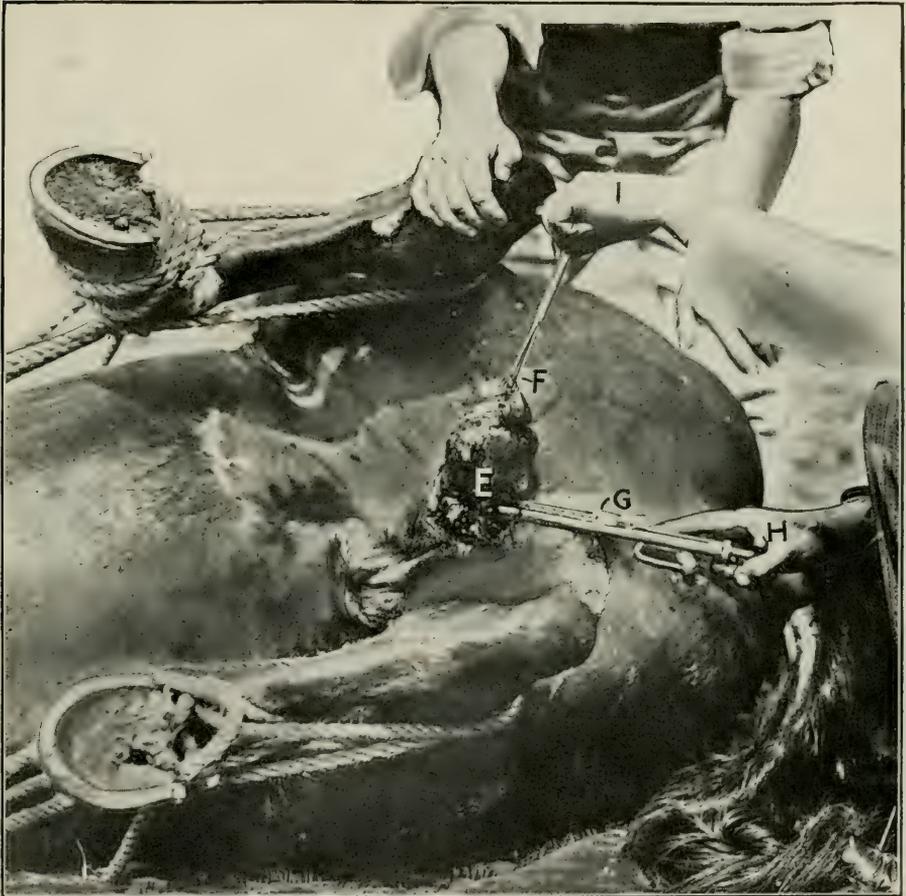


Fig. 58—Removing scirrous cord with ecraseur. E, Schirrous cord with ecraseur chain around it; F, vulsellum forceps; G, ecraseur; H, right hand of operator.

SCHIRROUS CORD OR CHRONIC FUNICULITIS (CHAMPIGNON)

Is an enlarging and hardening of the stump of the spermatic cord. It sometimes reaches enormous proportions, sufficiently large in some instances to fill and distend the whole inguinal canal and groin. In long

standing chronic cases the cord is surrounded by dense adhesions. A genuine schirrous cord never reduces in size spontaneously, but has a tendency to grow larger and become harder.

Cause—There are two principal reasons for this sequela of castration.

1. The operator leaving the stump of the cord sufficiently long to be caught between the lips of the scrotal incisions during the healing process. This, of course, strangulates the cord and causes it to enlarge and harden.

2. Infection either actinomycotic, streptococcic, or botryomycotic. This accounts for the constant pus discharge and numerous abscesses that make their appearance from time to time. Either ignorance or carelessness on the part of the operator is responsible for this condition. By removing enough cord and practicing cleanliness at the outset, schirrous cord would be to a large degree eliminated. The development of schirrous cords was largely reduced when the emasculator superseded the old-style clamp method of operating.

Treatment—In the acute stage of development—which means two to six weeks after castration—the scrotal region should be frequently cleansed by washing. The scrotal wound itself should be painted once every two days with tincture of iodine. During this period it is well to give iodid of potash in four-dram doses once a day. If at the end of six weeks the tumefaction still persists, the radical operation—which consists in total ablation—is justified and in fact indicated.

Restraint—Same as for ridgling castration, see page 46.

Position—Dorsal.

General Anesthesia is always indicated when possible, as the operation is extremely painful and usually prolonged for a considerable length of time in order to control hemorrhage.

Instruments, etc.—

1. Ecraseur (Fig. 41).
2. Threaded needles for ligating blood-vessels, suturing the skin incision and ligating the cord if for any reason the ecraseur fails to sever it.
3. Sterile gauze in liberal amount.
4. Hemostatic forceps (several pairs).
5. Sharp scalpel.
6. Vulsellum forceps (Fig. 56.)
7. Thumb tissue forceps.

Sterilization of Instruments, Cleansing Operator's Hands and Field of Operation—Same as for castration of the stallion. (Pages 20, 21.)

Operative Technique—With the field of operation, operator's hands, and instruments sterile and the animal in a dorsal position, proceed to operate as follows: With the scalpel make two curved elliptical incisions (D, Fig.

57) 5 inches long with the original cicatrix (scar) B as the center of the island of skin to be removed. These incisions should penetrate the skin and subcutaneous connective tissue only. By careful dissection (both sharp and blunt) the cord is gradually loosened and isolated by breaking down the numerous dense adhesions surrounding it. The elliptical island

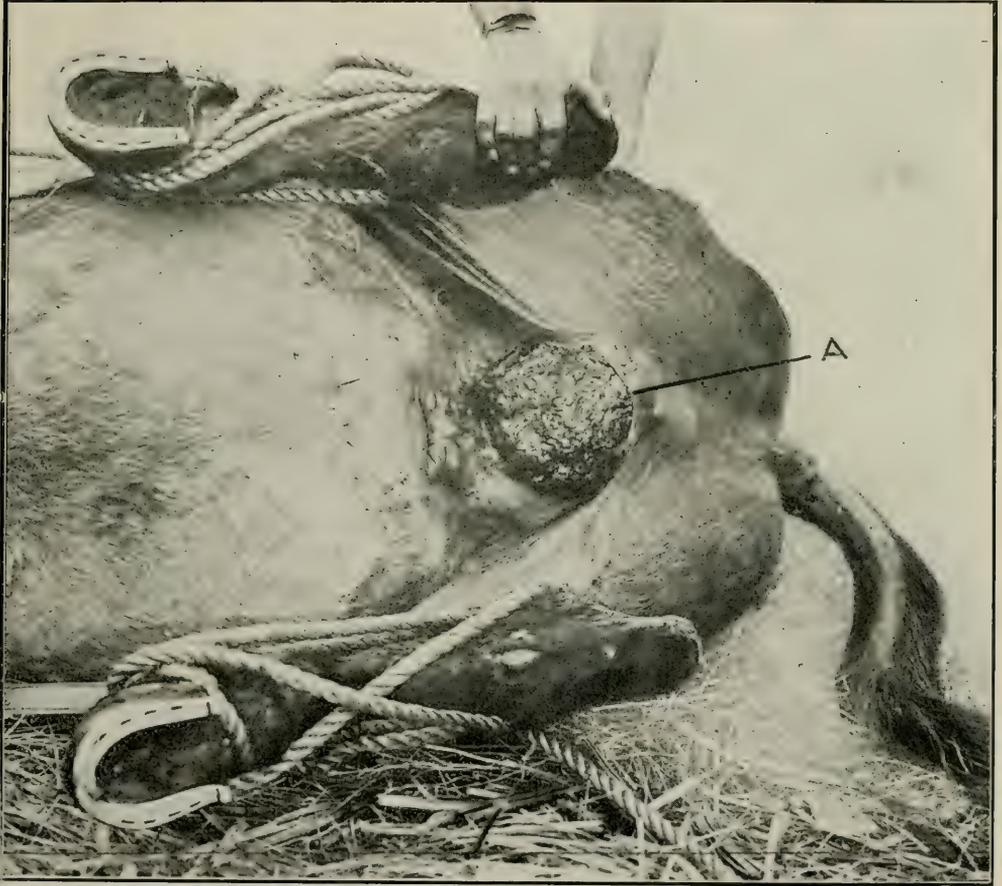


Fig. 59—Exuberant granulations which have assumed the chronic form and reached enormous size.

of skin which is removed on the end of the cord should be sufficiently large to include all external diseased tissue, such as sears, granulations, etc. The tumor is now grasped with the vulsellum forceps (Fig. 58), which are held by an assistant in such a manner as to afford considerable direct upward traction. With the cord tense from traction the careful dissection is continued up the inguinal canal until a point is reached well above the

diseased or indurated portion of the cord. If the entire cord is diseased, one should proceed to dissect up the canal to a point in close proximity to the internal abdominal ring. Usually after the cord is released from its scrotal adhesions the remainder of the dissection process can be completed by tearing with the fingers. All freely bleeding blood-vessels—except those in the cord itself—should be ligated as you proceed. When



Fig. 60—Well developed hydrocele ("water bag") in a three-year-old mule.
A, Hydrocele.

the growth is freed from all surrounding attachments the ecraseur chain should be placed around it as high up as necessary, and with continued traction from the vulsellum forceps the cord is quickly severed.

If the cord is too large to be severed by the ecraseur, then ligation must be resorted to. In such event the cord should be transfixed and ligated in several sections. The scrotal wound should now be irrigated thoroughly

with bichlorid mercury solution in the strength of 1-1000, after which pack tightly with formalin gauze and suture securely.

After-Treatment—If upon completion of the operation decided shock is imminent the animal should have strychnin one-half grain, and nitro-glycerin one-quarter grain, hypodermically. If a large amount of blood has been lost normal saline solution injected intravenously is indicated. Remove the packing in thirty-six hours and irrigate the wound daily with

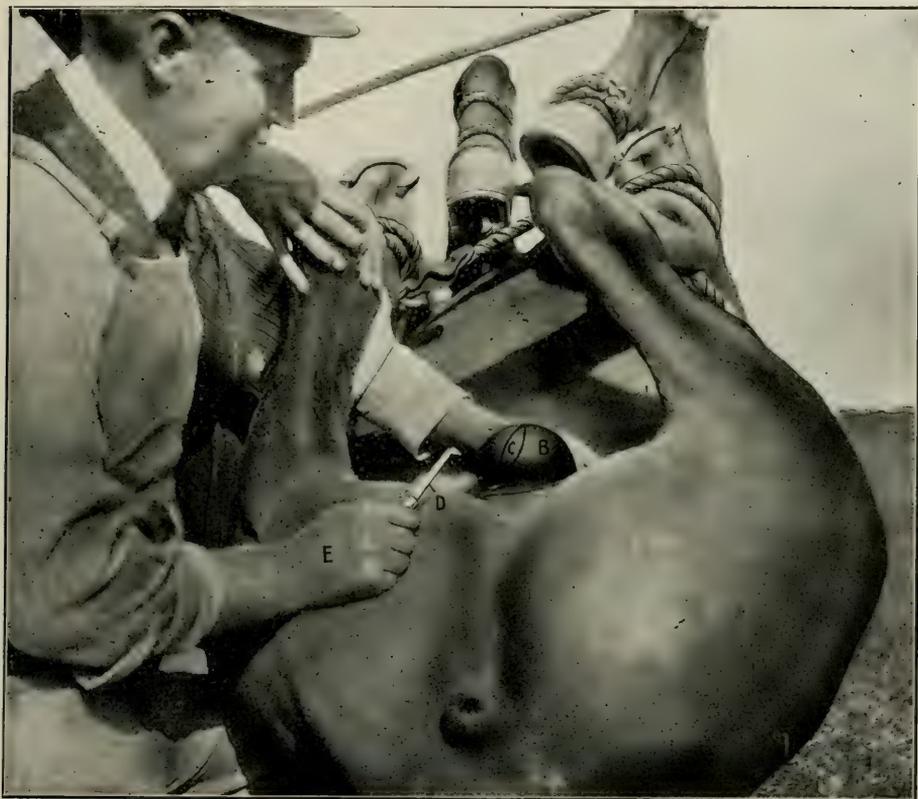


Fig. 61—Hydrocele showing skin incisions. B, Hydrocele; C, incisions; Miles' hooked knife.

Lysol or Cresolis Compound (U. S. P.), a tablespoonful to each quart of water.

EXUBERANT GRANULATIONS

On account of some mishap in operative technic or some character of infection, exuberant granulations sometimes appear as sequelæ of castration. They are, of course, acute at first but in most instances disappear without treatment. However, if a cure is not effected in the acute stage,

they assume a chronic form and may reach enormous proportions. (Fig. 59.) They are usually extra-serotal.

If not attached to the cord their removal and after-treatment is a simple matter, consisting in removing the skin by dissection well around their base, controlling cutaneous hemorrhage and daily washing the wound with antiseptic solution.

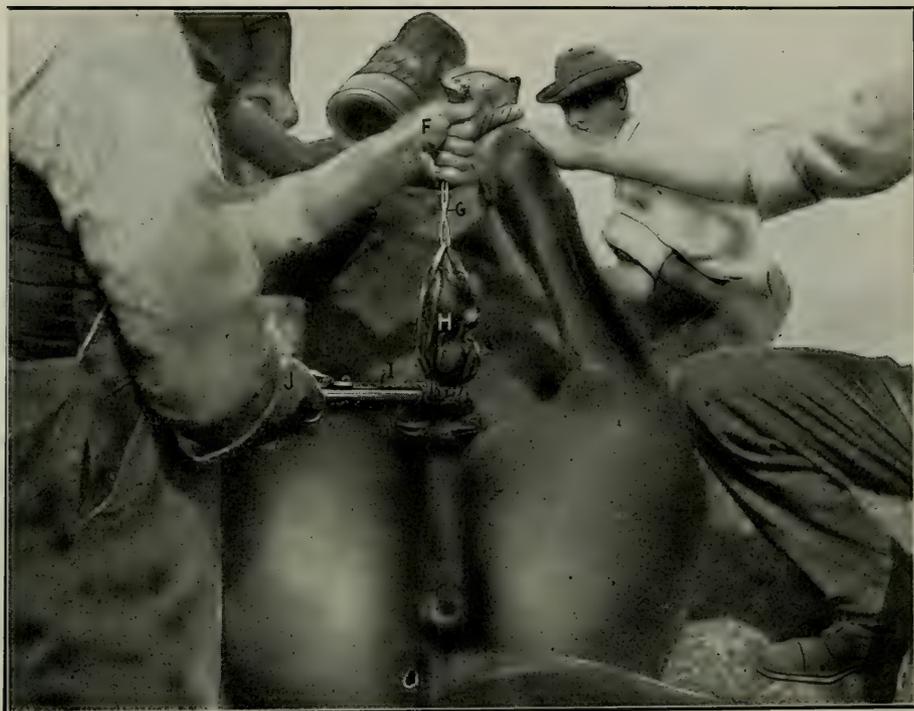


Fig. 62—Hydrocele showing method of removal by the ecraseur. F, left hand of operator; G, vulsellum forceps; H, hydrocele; I, ecraseur; J, right hand of operator.

HYDROCELE

(“*Water bag*,” “*water seed*”)—Is simply an accumulation of serous fluid in the testicular sac (*tunica vaginalis*), from which the testicle itself has been removed.

Cause—There is only one cause for this condition. It may be directly attributed to either the operators’ carelessness or ignorance. The only reason for the development of hydrocele as a sequela of castration is leaving too much of the *tunica vaginalis* in the serotum at the time of severing the spermatic cord. If at least one inch of the *tunica* be removed then there is no occasion, in fact, no possibility of a hydrocele developing.

Occurrence—Hydrocele rarely occurs in the stallion and colt, however, the reverse is true as regards the mule. Hydrocele is decidedly the most frequent sequela of mule castration, and nothing reflects quite so much—in mule-raising centers—upon a man's ability and qualification as having numerous mules which he castrates, develop "water seeds." While they do not interfere in the least with the general health and usefulness of the animal they are nevertheless great "eye sores," and depreciate the animal's marketable value, hence they should in every instance be removed by surgical interference. They may be unilateral or bilateral.



Fig. 63—Hydrocele after removal.

Preparation—Same as for castration of the stallion.

Sterilization of Instruments and Operator's Hands—Same as for castrating the stallion. (See pages 20, 21.)

Restraint—For small mules, same as for castration of the colt. (See page 32.) For large mules, same as for castration of the ridgling. See page 46.)

Position—Dorsal.

Instruments—

1. Miles' hooked castrating knife. (Fig. 25.)
2. Vulsellum forceps. (Fig. 56.)
3. Ecraseur. (Fig. 41.)
4. Hemostatic forceps.

Sterilization of Field of Operation—Same as for castration of the stallion. (See page 21.)

Technic of Operation—With Miles' hooked castrating knife two curved or elliptical incisions are made (C, Fig. 61) to the right and left of the most prominent part of the hydrocele (B). This means that the old cicatrix is in the center of the island of skin to be removed. These incisions should be made from four to five inches long—depending upon the size of the hydrocele. They should extend through the skin and subcutaneous connective tissue only. With the vulsellum forceps grasp the island of skin which is to be removed with the hydrocele. Have the assistant make upward traction while the superficial subcutaneous adhesions are being carefully broken down by sharp dissection. These adhesions never extend deep and are readily broken down. If necessary ligate the spurting blood-vessels as the operation proceeds. As soon as the scrotal adhesions are removed from around the tunica vaginalis the operator takes charge of the vulsellum forceps with his left hand and with the fingers of the right tears the tunica vaginalis loose from its delicate fascia attachments until a point is reached on the spermatic cord well above where it was formerly severed. The chain of the ecraseur is now applied to the tunica ("sac") and the tunica and the stump of the spermatic cord is severed. It is rarely necessary to pack the scrotum to control hemorrhage.

After-Care and Treatment—About all that is necessary is daily observation in order to see that everything proceeds well. If sequelæ arise they must be treated as outlined under their respective headings.

CHAPTER VI.

CASTRATION OF THE BULL

Objects and Indications—The operation is usually performed for purely economic purposes. However, in some instances, on account of diseased conditions of the scrotum, testicle and spermatic cord, it becomes necessary to castrate. Some bulls become so vicious as to be a source of danger and annoyance to their owners and attendants, and castration must be resorted to. As an economic operation, especially in young animals, its value is beyond estimate. Castration increases physical development and hastens early growth as well as improving the texture, odor, wholesomeness and nutritive properties of the beef. Bulls are also castrated for the purpose of producing work oxen. Another very important result of castration is the removal of inferior or scrub bulls from the herd.

Castrated bulls are known as steers.

Age—From several days to several years. The younger the better. Most calves are submitted to the operation when about two to three months of age.

Season—Early spring, late fall and winter. The bull or calf should never be submitted to castration during “fly time.” Bovine animals do not possess the same instinct in protecting themselves from flies, by warding them off with the tail, as does the equine species. On this account late spring, early fall and summer are unfavorable seasons for castrating this class of animals.

Preparation—No special preparation is necessary unless the animal is to be cast and tied, in which event have the alimentary tract empty by withholding feed for twenty-four hours before operating.

CASTRATION OF THE BULL IN THE RECUMBENT POSTURE

Restraint—When it becomes necessary to cast and tie the animal for this operation an excellent method of doing so is with the Conkey self-locking hobbles. (Figs. 64, 65.)

These hobbles have the advantages of being strong, safe, quickly applied and easily removed. The degree of restraint afforded by them is ample, especially when used in conjunction with an eighteen-foot rope. The animal may be cast and tied on either the right or left side, at the option of the operator. In applying hobble straps to cattle always buckle or loop them above the fetlocks, otherwise there is a tendency for them to slip over the foot and off. In casting on the right side as in Fig. 65, hobbles

are applied as follows: With an assistant (C) at the head, a "holder" in the nose (A) and a rope around the horns (B) buckle a hobble strap above both hind (G, H) and the right fore (E) proximal digital articulations. Buckle the master hobble strap above the left fore fetlock (D). Pass the end of the rope through the hobble strap (G) then through (H), then through (E), and lastly across through the self-locking buckle (F). By making traction on the rope (I) from (J)—at direct right angles to the animal—he is cast on the right side. After the animal is cast (See Fig. 65) the uppermost hind leg (N) is released from its hobble strap and the

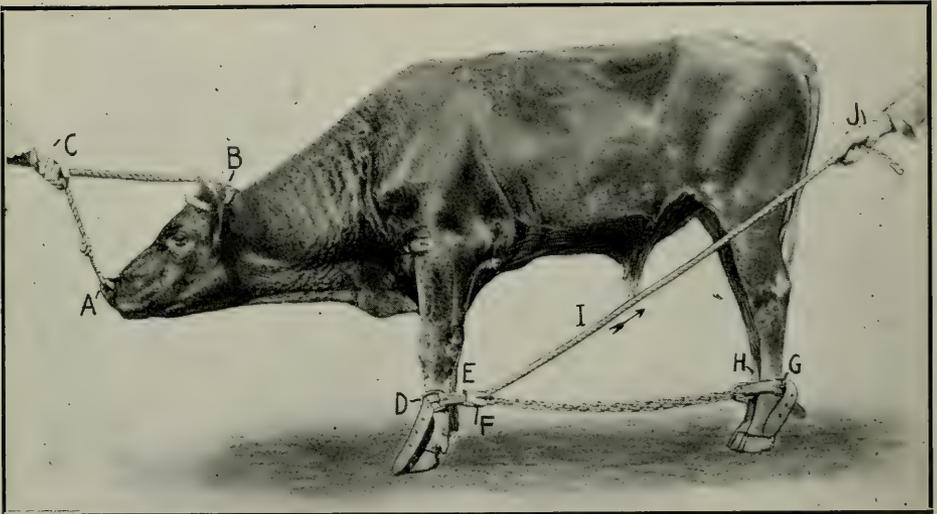


Fig. 64—Conkey's self-lock buckle hobbles applied.

end of an eighteen-foot rope looped on instead of the hobble strap. This rope (P) is passed over the withers (O) under the neck (Q) and above the hock (R) in such a manner as to draw the foot against the abdomen and flex the hock to a certain degree. With the animal in this position the operation can be performed without danger to either the operator or patient. Calves may be held by one or more assistants without tying.

Instruments—The emasculator (Figs. 5, 6, 7, and 8) and castrating knife are the only instruments needed. The Miles hooked castrating knife (Fig. 25) and the Williams castrating knife (Fig. 2) are equally satisfactory for this operation.

Anatomy—In order to operate intelligently, some knowledge of the anatomy of the scrotum, testicle and inguinal canal is necessary. However, lack of space prevents going into details here. By reference to Fig. 66

a general idea of the relation and position of the generative or reproductive organs of the bull may be had.

Testicle—The testicle is a compound tubular gland ovoid in shape and well developed with its long axis vertical. On the epididymis is a well developed globus major.

Penis—The penis is round and long. It projects far under the abdomen and possesses the well recognized S-shape curve. Its gland is small and pointed.

Prepuce—The prepuce is located well under the abdomen. It is simply



Fig. 65—Bull cast and tied for castration operation.

an elastic sheath, surrounded at its external opening by long stiff hairs. Its cavity is from ten to fifteen inches long.

Scrotum—The scrotum is long and pendulous, and has a well marked neck. It is suspended between the thighs somewhat further forward than in the stallion.

Spermatic Cord—The spermatic cord and its covering—tunica vaginalis—is much longer than in the stallion.

Inguinal Canal—This canal is long and narrow, and directed almost perpendicular to the scrotum.

Sterilization of Instruments and Cleansing Operator's Hands—Same as for castration of the stallion. (See page 20.)

Disinfection of the Operative Field—While this step in the operative procedure is usually ignored entirely or done in a perfunctory manner, such neglect is inexcusable. On account of the danger of sepsis and other

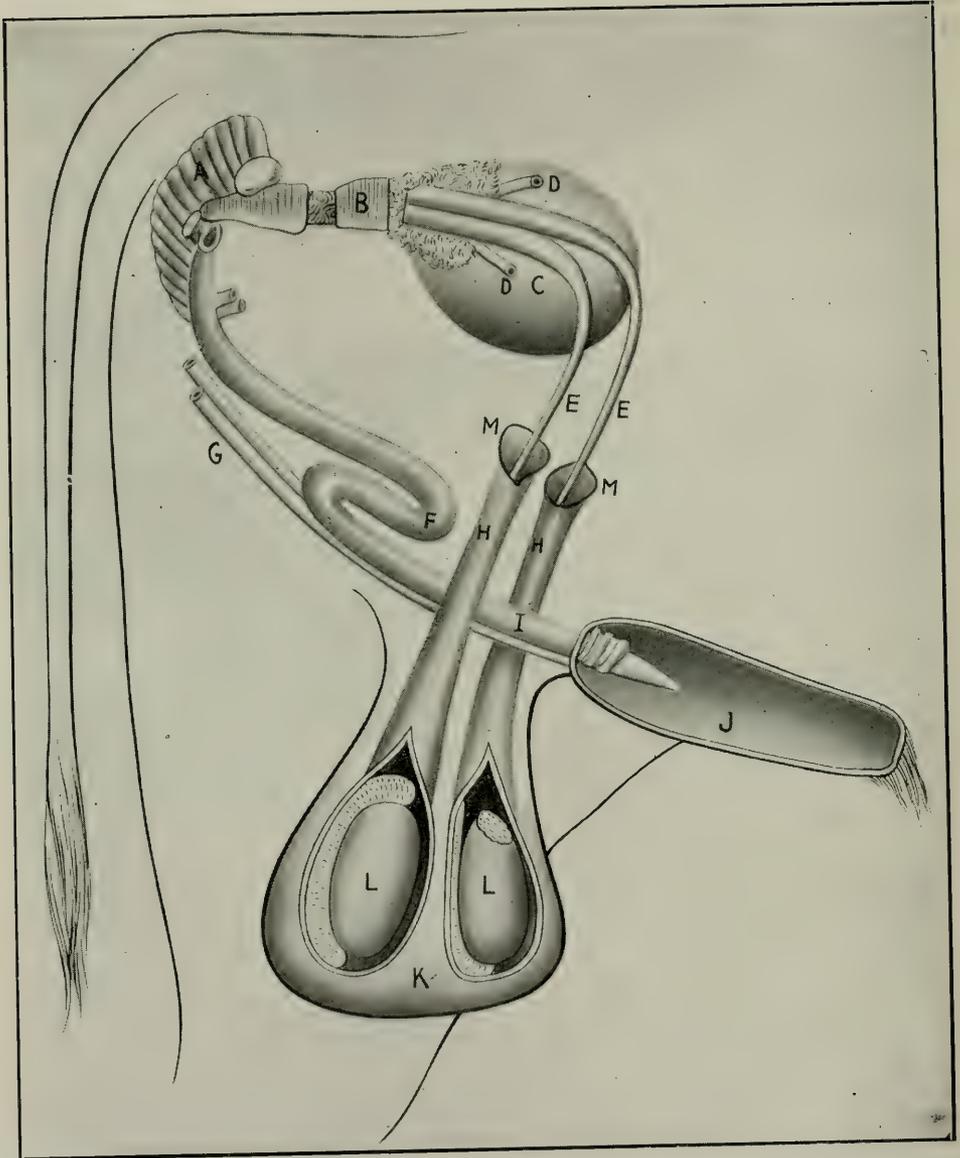


Fig. 66—Generative or reproductive organs of the bull. A, Ejaculator seminalis. B, intrapelvic portion of urethra; C, urinary bladder; D, D, ureters; E, E, intra-abdominal portion of spermatic cords; F, S-shape curve of penis; G, retracto-muscles of sheath; H, H, tunica vaginalis; I, penis; J, prepuce; K, scrotum; L, L, testicles; M, M, internal abdominal rings.

sequelae known to follow bull castration, the operator should take the time and precaution necessary to cleanse and disinfect the field of operation. This may be quickly done as follows:

(a) Scrub the scrotum and the inside of the thighs with soap and warm water until all visible dirt is removed.

(b) Wash the parts with Lysol or cresolis compound, (U. S. P.), one tablespoonful to each quart of water.



Fig. 67—Testicle of the bull. A, spermatic cord; B, testes; C, globus major of epididymis; D, epididymis.

Operative Technic—There are two methods of making the serotal incision: (a) lateral or side incisions (Fig. 68); (b) end incision (Fig. 69).

Lateral or Side Incision—This method is the most popular one, as after recovery there is less mutilation of the scrotum.

Grasp the left side of the serotum in the left hand and by compressing it force the right testicle to the right until the skin of the serotum is stretched taut. With a sterilized knife begin the incision four inches above

the apex of the scrotum and bring it down to near the apex. The incision should be made through the skin, subcutaneous connective tissue dartos and tunica vaginalis. This exposes the testicle. Grasp the testicle with the right hand and with the left strip the attached scrotal tissue from the cord until the cord itself is isolated well up to the summit of the scrotum. The final step of the operation consists in grasping the testicle with the

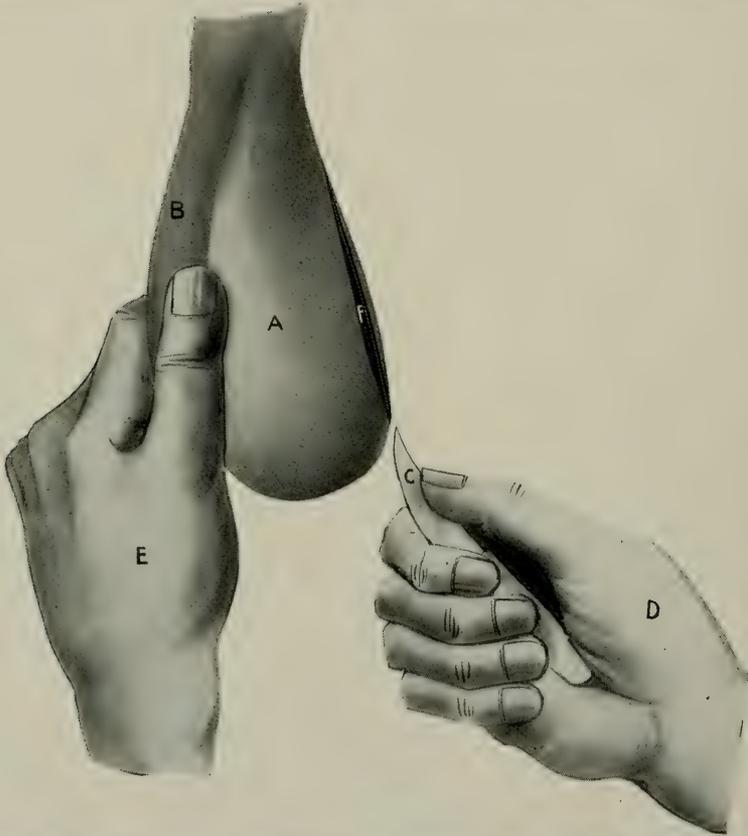


Fig. 68—Method of making lateral or side scrotal incision. A, Right testicle in scrotum; B, scrotum; C, knife; D, position of the right hand; E, position of the left hand; F, incision.

left hand and making two pounds traction on its cord. With the right hand apply the emasculator to the spermatic cord and force the emasculator well to the top of the scrotum. By bringing the handles together the cord and its coverings are severed. The opposite testicle is in like manner removed.

(b) The other method of making serotal incisions (Fig. 69) consists in grasping the base of the scrotum with the left hand and by compressing

it force the testicles upward until the lower one-third of the scrotum can be severed without injuring them. With the knife in the right hand it is an easy matter to remove the lower one-third of the scrotal sac.

The tunica vaginalis containing the testicles drops outside the remaining portion of the scrotum. By nicking the tunic the testicles themselves are

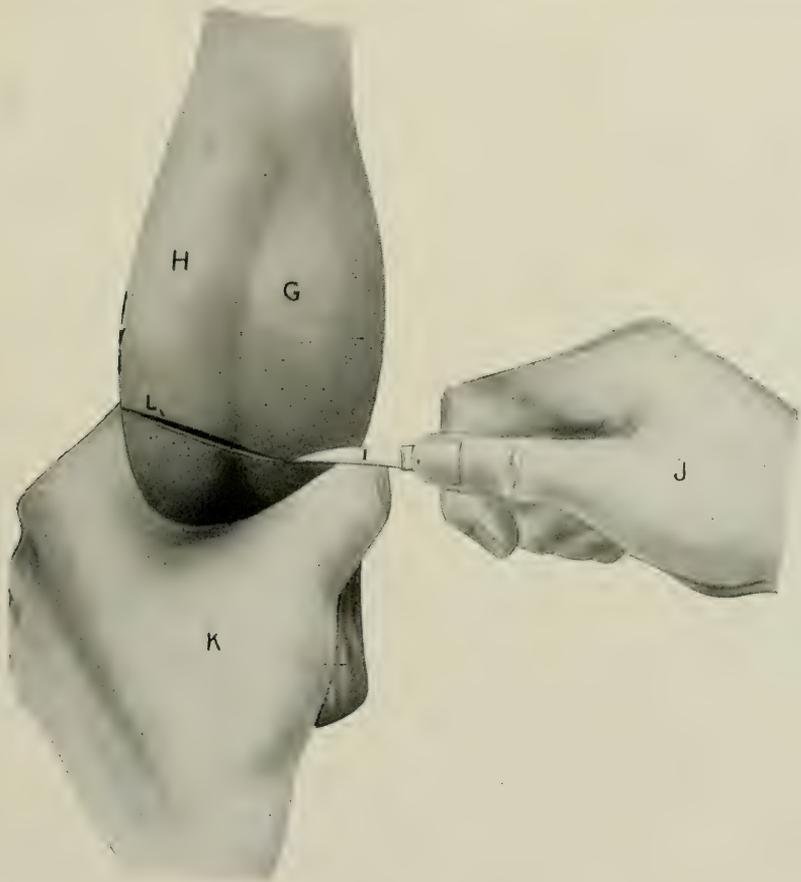


Fig. 69—Method of operating in which apex (bottom) of scrotum is removed. G, H, testicles in scrotum; I, knife; J, position of the right hand; position of the left hand; K, position of the left hand; L, incision.

exposed. With the right hand grasp one of them and make two pounds traction on the cord, with the left hand strip the scrotal tissue from the cord until it is isolated well up to the summit of the scrotum. Next grasp the testicle with the left hand and make two pounds traction on the cord. With the right hand apply the emasculator and force it upward to the summit of the scrotum in order that a sufficient amount of spermatic cord

may be removed. By bringing the handles of the emasculator together the cord and all its coverings are severed. This method has the advantage of affording ideal drainage.

After-Care—Turn out to pasture and make daily observation to see that all is going well. If the scrotal wound closes in such a manner as to interfere with drainage and cause extensive swelling, it should be opened and the scrotum irrigated with an antiseptic solution.

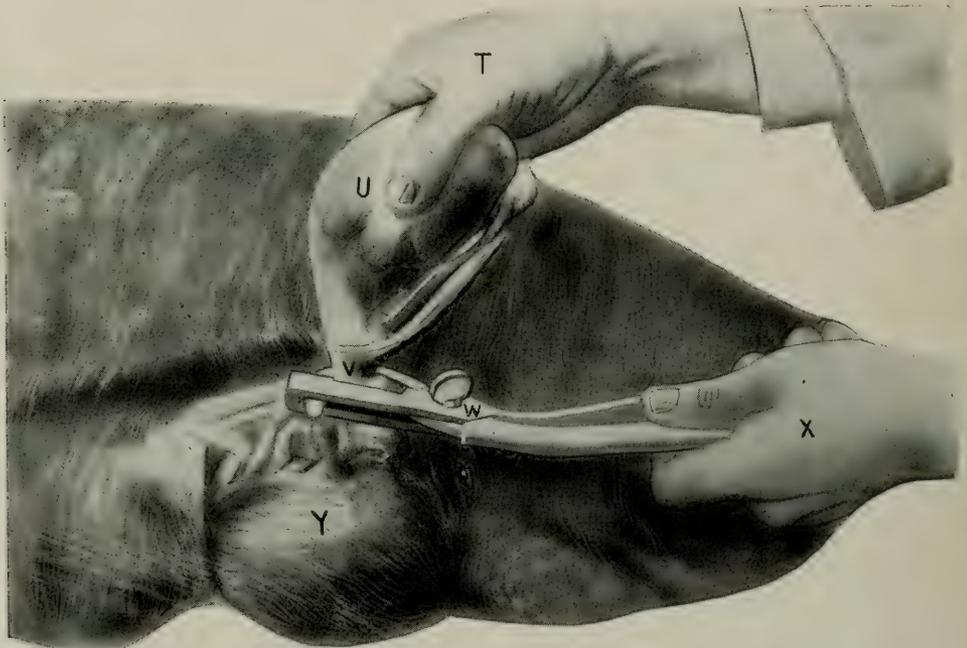


Fig. 70—Severing spermatic cord with emasculator (recumbent posture). T, position of right hand; U, testicle; V, spermatic cord and its covering; W, emasculator; X, position of left hand; Y, opposite testicle in scrotum.

CASTRATION OF THE BULL IN STANDING POSTURE

Restraint—If the animal has horns a strong rope may be looped around their base and his head drawn close up to a post. In most instances this is all the restraint employed. Contrary to the prevailing popular opinion the bull can actually kick backward about as hard as he can kick sidewise. In castrating bulls in the standing posture the operator must either stand out of range of the hind feet, confine them by means of ropes, or take chances on being kicked. In castrating young bulls (3 to 6 months of age) the standing posture is ideal and injury to the operator from kicking is extremely rare.

The same instruments, preparation, disinfection of the site of operation,

sterilization of instruments, scrotal incisions, etc., are employed here as in castrating bulls in the recumbent posture. While making the scrotal incision the operator should have his knife under thorough control, as at this time there is almost invariably an abrupt movement on the part of the

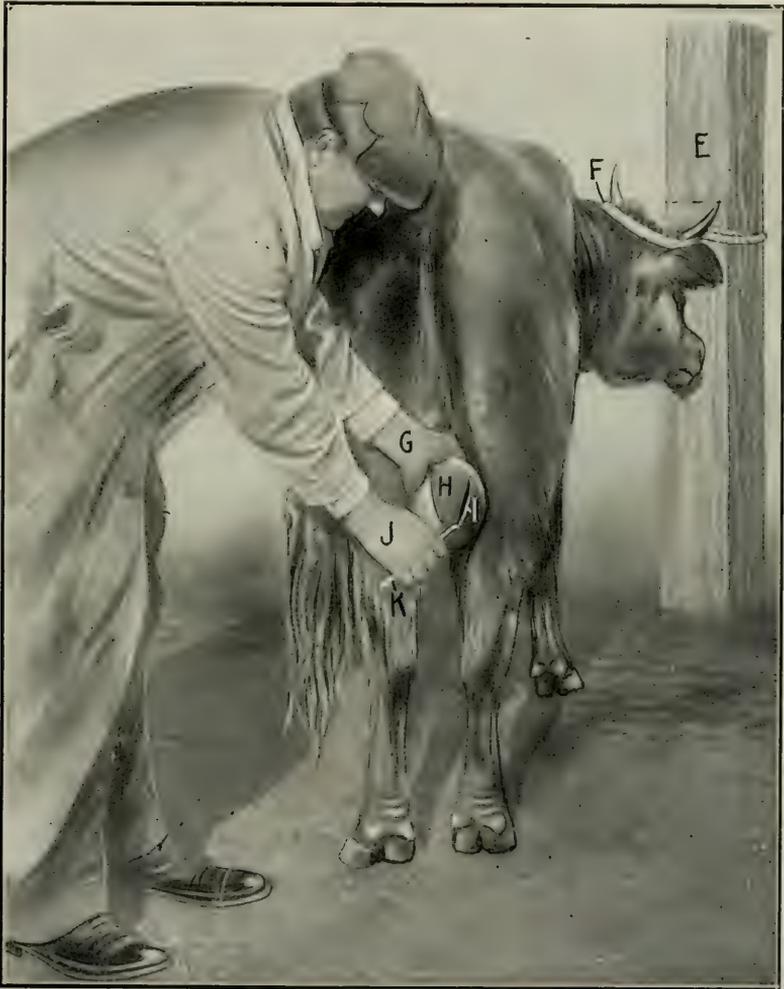


Fig. 71—Castration of the bull in standing posture. E, Post to which the head is securely tied; F, rope; G, position of the left hand; H, scrotum; I, incision; J, position of the right hand; K, knife.

animal which may result in the knife coming in contact with the tendo achillis (hamstring) and inflicting irreparable damage. Calves are castrated in the same manner as bulls.

CASTRATION OF THE CRYPTORCHID (RIDGLING) BULL

Compared with the horse and hog, cryptorchidism in cattle is extremely rare. However, such a complication does actually exist, and it behooves those who are expected to perform such operations to qualify themselves for this one.

Objects and Indications—Same as for castration of the bull. See page 85.

Age—Six to twelve months.

Preparation—Withhold all food for twenty-four hours previous to operation.

Position—Standing.

Restraint—A simple, quick and efficient method of handling a bull for

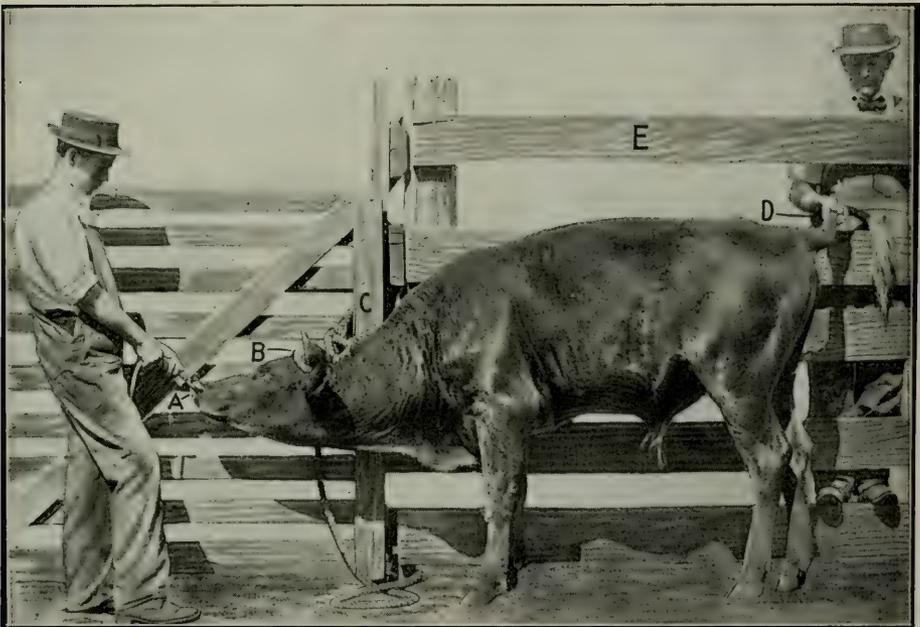


Fig. 72—Ridgling bull confined for castration.

this operation is illustrated in Fig. 72. With a rope around the horns (B), if "polled" use a halter, and a holder in the nose (A), the head is made fast to a post (C). While the assistant continues to hold the rope attached to the nose the second assistant grasps the tail (D) and draws it between the slats of a gate or fence (E). With the animal in this position and thus secured, he can be castrated with little annoyance so far as body movement is concerned. If stocks are available, of course they should be used in preference to this method.

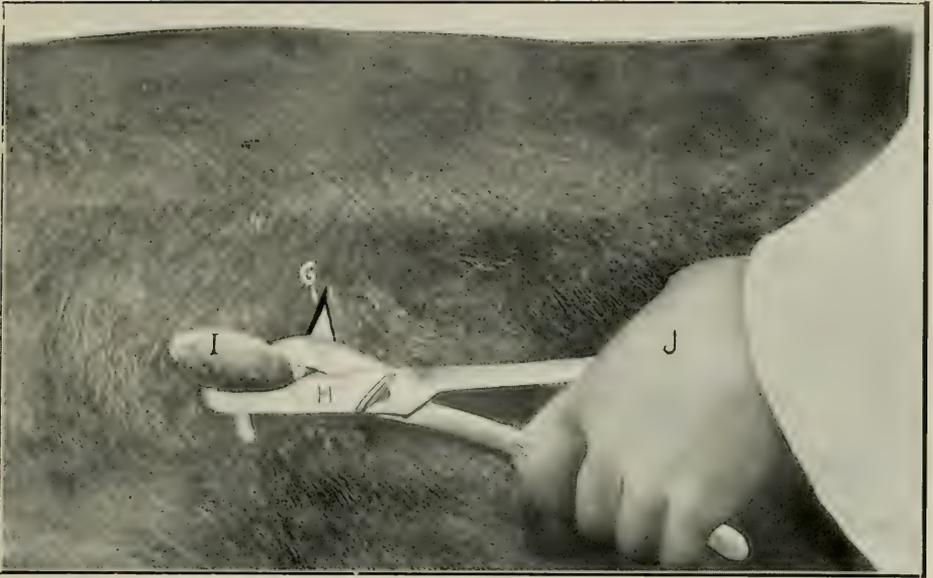


Fig. 73—Removing the testicle of a ridgling bull with the emasculator. G, Flank incision; H, emasculator; I, testicle; J, position of the operator's right hand.



Fig. 74—Flank incision closed by three interrupted sutures. K, strong linen or silk sutures.

Instruments—

1. Miles' hooked castrating knife. (Fig. 25.)
2. Emasculator. (Figs. 5, 6, 7 and 8.)
3. Hair clippers. (Fig. 145.)
4. Spaying needle. (Figs. 151, 152.)
5. Strong flax or braided silk for flank sutures.

Sterilization of Instruments and Cleansing Hands of Operator— The instruments should be boiled for fifteen to twenty minutes. The operator's hands should be thoroughly washed with soap and warm water, using a scrub brush, and rinsed in Lysol or cresolis compound, (U. S. P.) one tablespoonful to each quart of water.

*Preparation of Operative Field—*With clippers the hair in the flank region should be removed, after which thoroughly wash the parts with soap and warm water, using a scrub brush, then with Lysol or cresolis compound, (U. S. P.), one tablespoonful to each quart of water. As a further precaution against septic infection the skin should be painted with tincture of iodine.

*Operative Technic—*The most popular and satisfactory method of operating is flank laparotomy, which is as follows: With Miles' hooked castrating knife make a flank incision in the same manner and the same size as for heifer spaying. All the details of this incision are well illustrated and described under the head of heifer spaying, and the reader is urged to refer to this chapter before reading further in regard to the technic of the operation.

The flank incision itself is by far the most important step of the operation, and remember that there is only one proper way to make it. Learn how it should be made and make it that way.

If invading the left flank, the operators' left hand should be forced through the abdominal incision and a careful search made—toward the pelvic region—for either the testicle or spermatic cord. One or both of them will soon be encountered. Bring the testicle outside the abdominal cavity if the cord is sufficiently long to permit it. Then sever the cord with an emasculator and drop the stump of the cord back into the abdominal cavity. If the cord is not long enough to permit of the testicle being brought out of the abdomen, the emasculator or ecraseur may be passed through the incision and the cord severed inside the abdominal cavity. The wound is now sponged off with antiseptic solution and closed by three interrupted sutures.

*After-Care—*Limit the diet for five days. Removal of sutures at the expiration of eight days. If "stitch abscess" forms, the sutures may be removed at an earlier date.

Sometimes the wound becomes infested with screw worm larvæ or maggots. In such cases the free application of either chloroform or gasoline to the scrotum is indicated. This treatment also suffices to free the scrotum of rams and boars from maggots.

CHAPTER VII.

CASTRATION OF THE BOAR

Objects and Indications—Pigs are castrated in order to facilitate their growth and fattening. Aside from this the operation has a tendency to improve their behavior when associated with other hogs, especially sows. Boars are often castrated when, having reached the limit of usefulness as breeding animals, it is decided to prepare them for market. Even when castrated, boars never make choice meat. However, they fatten very readily and their characteristic odor disappears to a decided degree. Castrated boars are known as “stags.” Castrated pigs are referred to as “barrows,” and it is a well-recognized fact that barrows command a higher market price than do boars or stags.

Castration is an operation that is practiced wherever swine are raised.

Age—Pigs are best castrated either two weeks before, or two weeks after weaning. If the operation is performed at, or near weaning time it has a tendency to retard their growth and development. If allowed to run too long they become “boarish,” besides the operation is more painful.

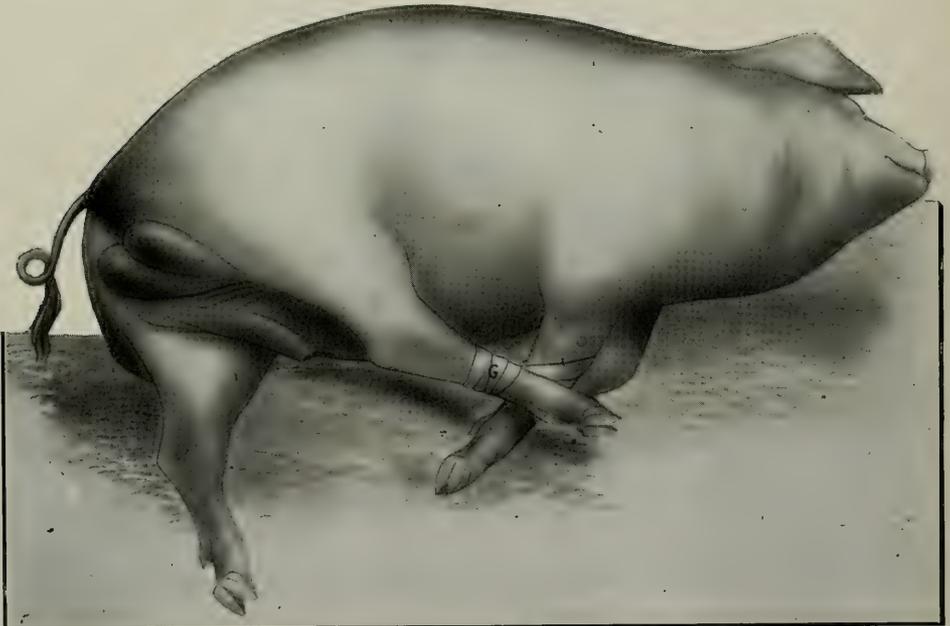


Fig. 75—Restraint for castration.



Fig. 76—Restraint of a large boar for castration.



Fig. 77—Restraint for castration.

Season—Hogs should not be castrated during the summer months while flies are prevalent. It is best to operate during the late fall, winter and early spring. Avoid operating in extreme cold weather.

Preparation—No special preparation is necessary unless it be to have the intestinal canal comparatively empty, thus lessening the danger of injury from handling.



Fig. 78—Holding pig for castration.

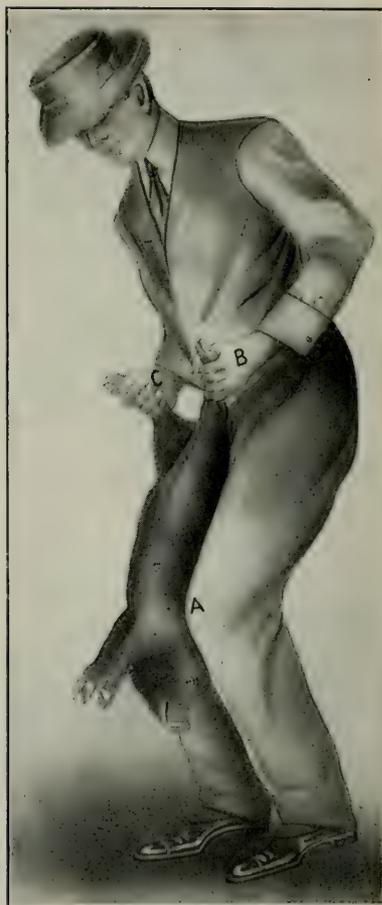


Fig. 79—Holding pig for castration.

Restraint—In castrating large boars it is necessary to take advantage of the animal to a very decided degree. This is essential, first, on account of the great strength of the animal compared to its size, and, second, on account of there being no favorable part or appendage of the hog by which a firm hand hold can be taken. Satisfactory restraint may be had

by several different methods. Fig. 75 illustrates casting and tying the animal by bringing three feet together.

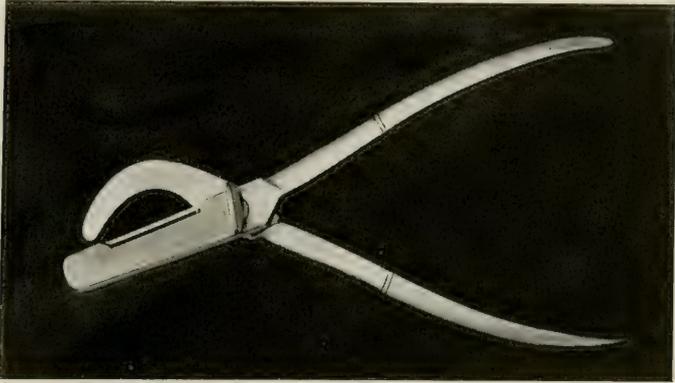


Fig. 80—Swine and sheep emasculator.

To thus secure a large hog requires considerable time and much effort, also the services of several assistants. A favorite method of the author for handling large boars for this operation is graphically illustrated in Fig. 76.



Fig. 81—Testicles of boar. O, Testes; P, R, epididymis; S, T, spermatic cord.

It consists in placing the loop of a half or three-quarter inch rope over the neck and behind one shoulder, then throwing the rope over the beam

above and having the assistant draw the forefeet of the hog off the floor by traction on the rope. This renders the animal absolutely helpless. By such a method the operator with one assistant can handle the largest hog.

Another quick method of restraint for operations of this character is illustrated in Fig. 77.

This consists in placing a rail or bar over the neck of the hog where it is held by the weight of an assistant.

Figs. 78 and 79 illustrate two methods of holding pigs and small shoats for operation.

Instruments—

1. Williams' castrating knife. (Fig. 2.)
2. Emasculator. (Fig. 80.) This is an instrument specially con-

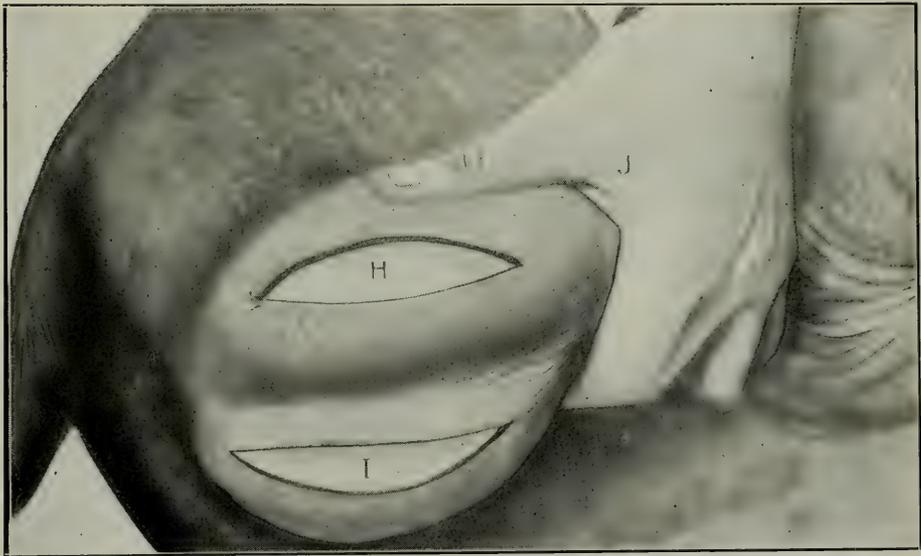


Fig. 82—J, Hand; H, I, incisions in scrotum.

structed for castrating swine and sheep, and is about one-half the size of the one used in castrating stallions and colts and about twice the size of the canine and feline instrument.

*Anatomy—*The scrotum consists of two pouches formed by skin, subcutaneous connective tissue, etc. These pouches are divided by a raphe or median line and fit up close to the perineal region. These pouches each contain a testicle (Fig. 81) which is decidedly shorter and more rounded than the testicle of many of the other domestic animals. The long axis of the testicle in swine is vertical.

Disinfection of Operative Field—Same as for castration of the bull. (See page 96.)

Sterilization of Instruments and Cleansing Hands of Operator—Same as for castration of the bull. (See page 20.)

Operative Technic—With sterile instruments, clean hands, and the animal properly secured, this operation is simple and an extremely easy

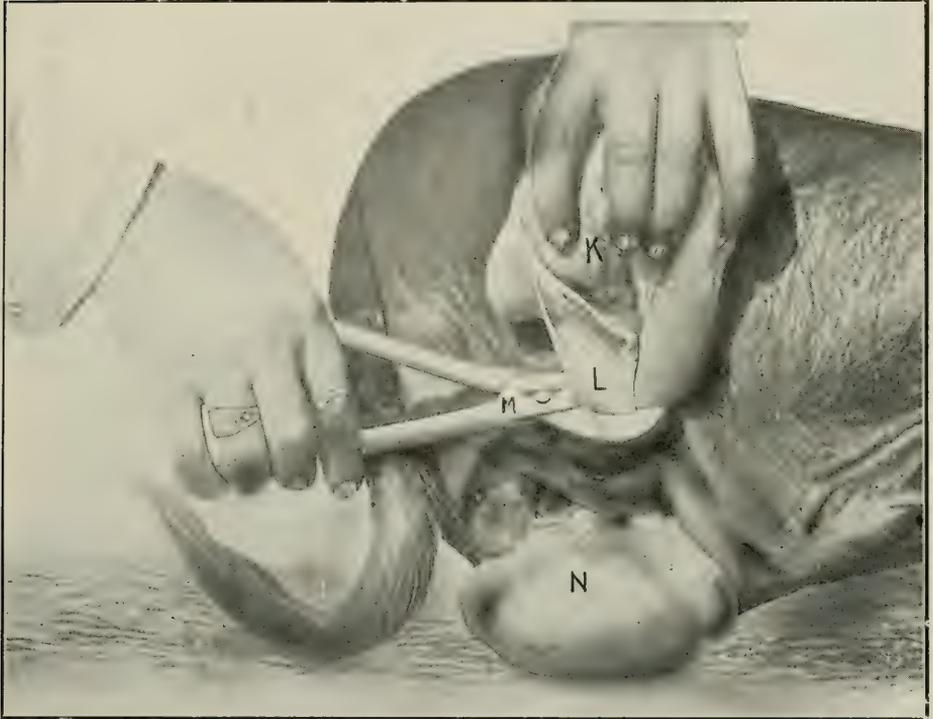


Fig. 83—Severing spermatic cord and its covering with emasculator. K, Testicle; L, spermatic cord and its covering; M, emasculator; N, opposite testicle.

one to perform. The scrotum is firmly grasped with the left hand and two bold incisions made. (H, I, Fig. 82.)

These incisions should begin well forward on the scrotum and extend sufficiently far back to allow the testicle to be removed from the scrotum without effort. The larger the incision the better. These incisions should be parallel to each other and to the median line. They should be from one-half to one inch—depending on the size of the hog—to each side of the median line. If for any reason the first incision was not sufficiently deep to penetrate the tunica vaginalis (sac covering testicle) and completely releasing the testicle from the scrotum, then with another stroke of

the knife this tunic is incised, allowing the testicle to escape from the scrotum. The testicle is now grasped with the left hand, by which it is advisable to apply about one to two pounds traction on the cord, after which apply the emasculator (M) to the cord and its coverings (L) as close to the skin or scrotal incision as possible, being careful that the instrument be at direct right angles to the cord, after which the cord is severed by bringing the handles of the instrument together. (Fig. 83.) The opposite testicle is removed in like manner.

After-Care—Immediately after castration it is well to turn the animals to pasture—preferably where there is running water. In any event get them away from the barn and barnyard and do not allow them access to

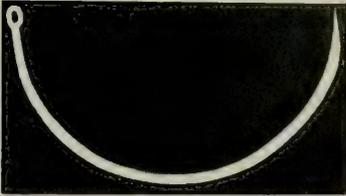


Fig. 84—Hagedorn's needle No. 3.
(Actual size.)

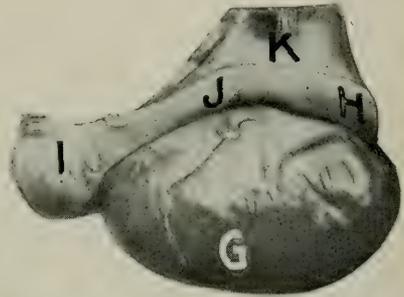


Fig. 85—Testicle of ridgling boar. G. Testes; H, globus major; I, globus minor; J, body of epididymis; K, spermatic cord.

stagnant and filthy wallow holes. Recovery is usually prompt and the mortality is small.

Sequelae—Septicemia (blood poison), peritonitis, scirrhus cord, tetanus (lock jaw), hemorrhage.

CASTRATION OF THE CRYPTORCHID (RIDGLING) BOAR

Objects and Indications—All ridgling boars and pigs should be castrated. The principal reasons for so doing are outlined under the proper heading in describing castration of the boar. (Page 98.) Furthermore, operation is strongly advised, since the modus operandi itself is easy and comparatively simple and attended with little danger if proper surgical procedure is adhered to.

Age—At about 25 to 35 pounds weight.

Preparation—The pig must be gaunted. This condition is secured by withholding all food for twenty-four hours previous to operating. A plentiful amount of water may be allowed.

Warning—The pig should be free from constitutional diseases and in good physical condition. Before operating, see that the testicle is not located in the inguinal canal. This precaution is essential because of the fact that if the testicle is in the canal it cannot be withdrawn through the abdominal incision.

Restraint—Since the operation consists in median line laparotomy the



Fig. 86—Abdominal incision.

animal should be suspended from the ground to a post or beam above until the site of incision is about opposite the operator's breast.

Instruments—

1. Miles' hooked castrating knife. (Fig. 25.)
2. Emasculator. (Fig. 80.)
3. Hagedorn needle (Fig. 84) carrying 20 inches of braided silk No. 12 for abdominal sutures.
4. Richter's needle-holder (Fig. 34).
5. Curved scissors (6-inch) (Fig. 35.)

Position—Hanging.

Sterilization of Instruments and Cleansing Hands of Operator—Satisfactory recoveries largely depend upon cleanliness, and it behooves the operator to take extra precautions in this particular. Simply because the animal is a hog is no reason why it should be carelessly operated upon. Boil the instruments for 15 to 20 minutes, after which immerse them in

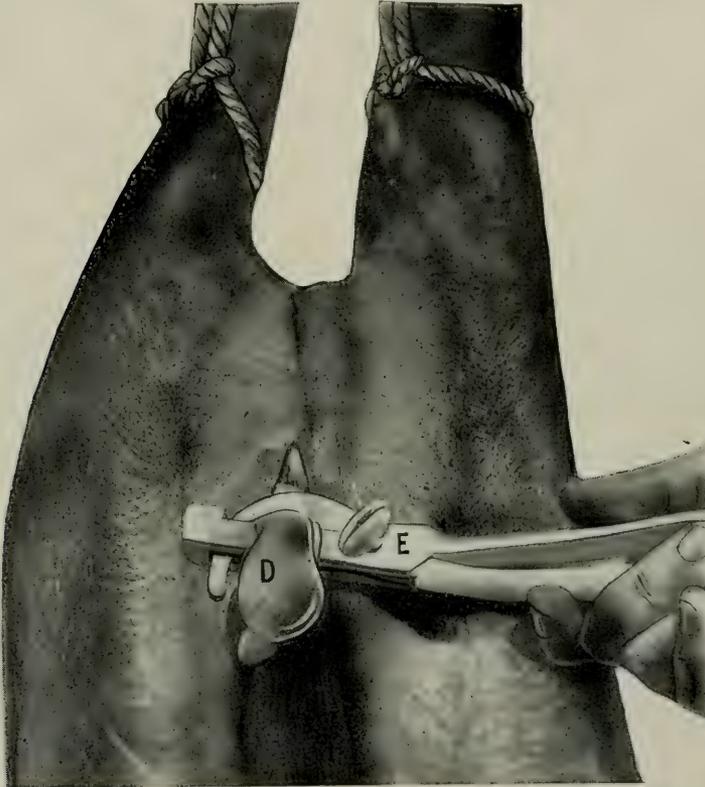


Fig. 87—Severing spermatic cord with emasculator.

clean pans containing Lysol or liquor cresolis (U. S. P.), one tablespoonful to each quart of water.

Disinfection of Operative Field—Clip the hair from the belly from the umbilicus to the brim of the pubis. Wash the parts with tincture of green soap and warm water using a scrub brush, after which paint the skin with tincture of iodine.

Operative Technic—With the animal hanging, the instruments sterilized, hands of the operator and the site of incision cleansed and disinfected, proceed as follows: Select a site either to the right or left of the median

line of the abdomen, two inches below the brim of the pubis for the abdominal incision (A) (Fig. 86.) Care must be exercised to avoid the penis, the course of which is in the median line. This incision should be three inches long and penetrate all the layers of the abdominal wall. The



Fig. 88—Abdominal wall closed by three interrupted sutures.

index and second finger are now introduced into the abdominal cavity, and a search made for the testicle. This organ is usually short corded and hangs against the posterior abdominal wall, directly in front of the abdominal incision. If the spermatic cord be long, then the testicle itself may be quite a distance below the abdominal incision, in which event the cord is located and drawn through the abdominal incision, and as a natural conse-

quence the testicle will follow. The spermatic cord is now severed and its stump replaced in the abdominal cavity. If it be a double cryptorchid (both testicles undescended) both testicles should be removed through the one abdominal incision. The abdominal wall should now be closed with three interrupted sutures. (Fig. 88.) These sutures should be what is known as the through-and-through variety—all layers of the abdominal wall should be included in them.

After-Care—The animal should be confined for eight or nine days in a

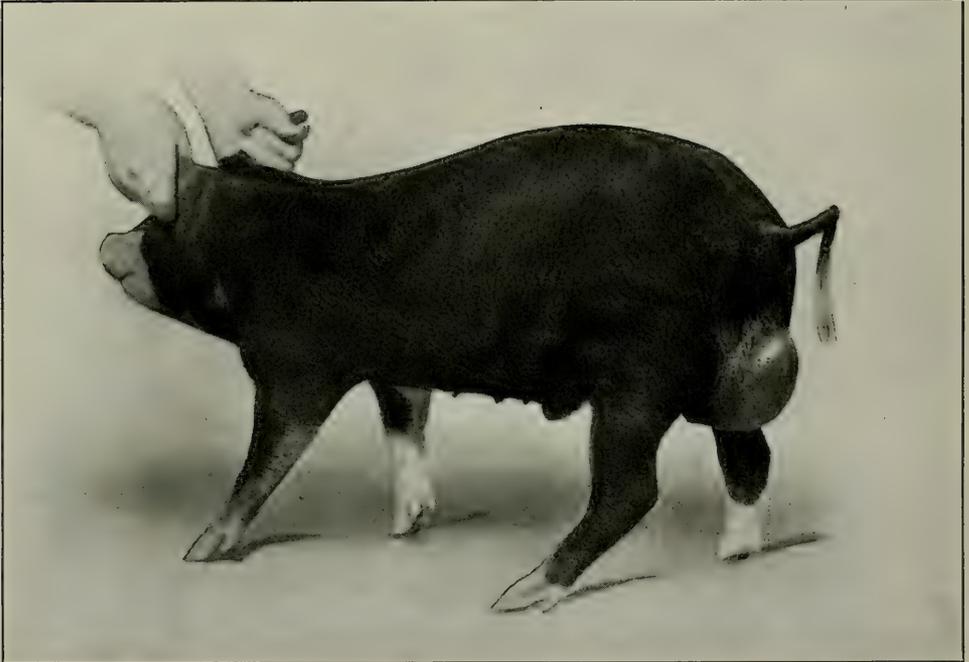


Fig. 89—Ruptured boar.

small, clean pen; during which period the diet should be limited. Nature will ordinarily take care of removal of the sutures.

CASTRATION OF THE RUPTURED BOAR

Scrotal hernia (rupture) in the boar occurs invariably and directly as a result of dilatation or enlargement of the internal abdominal ring. The anatomical function of the internal abdominal ring is to allow the spermatic cord to pass from the abdominal cavity into the inguinal canal and at the same time prevent the passage of any portion of the intestines escaping from the cavity into that canal.

Causes—The experience of others and my own observation lead me to

believe that scrotal hernia of the boar is one condition which can be truthfully laid at the door of hereditary transmission in 95 per cent of cases. They are of congenital origin, the internal abdominal ring being open at birth and nature fails to close it afterward. In my own practice I recall one sow in particular which presented her owner with a bunch of ruptured pigs twice each year. This sow gave birth to large litters and was kept as a brood sow on that account. These litters were usually about

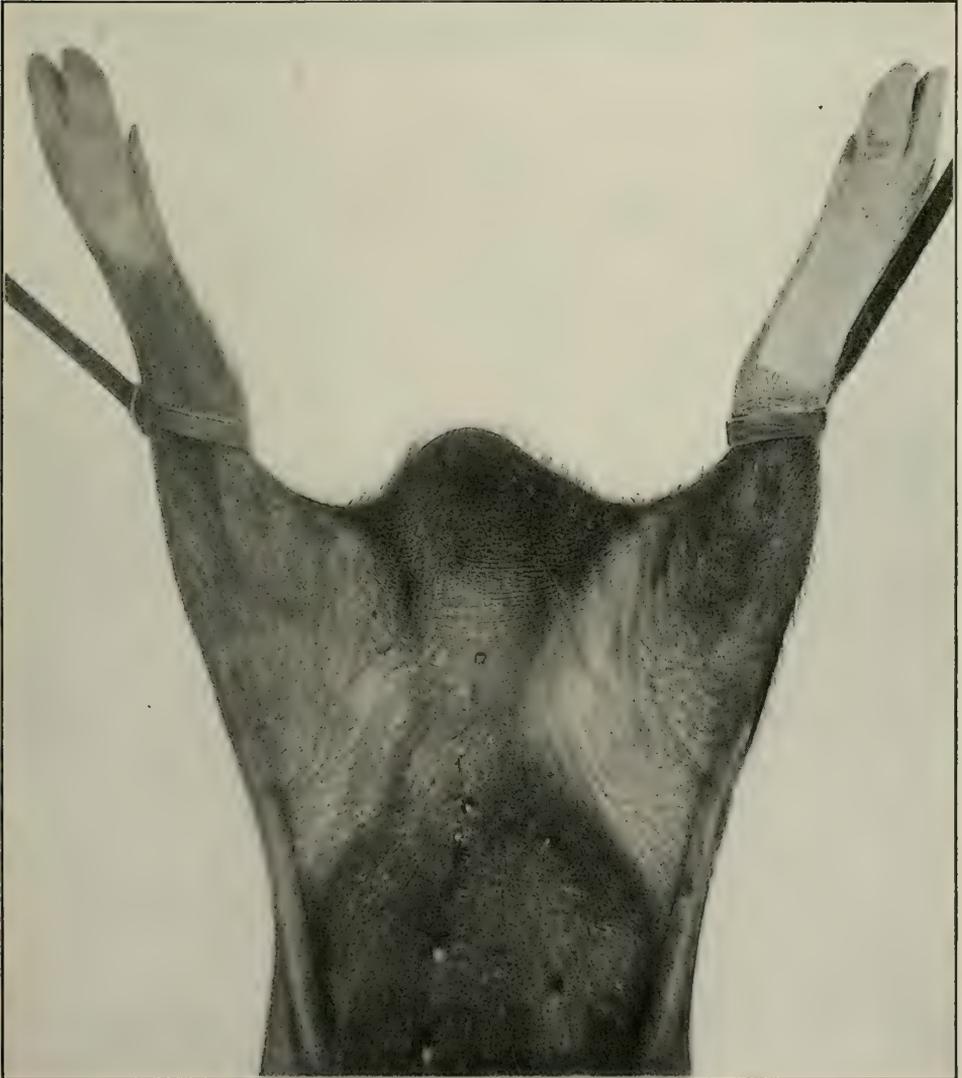


Fig. 90—View of the scrotum after animal is hung up for operation.



Fig. 91—Incision in groin directly over the internal abdominal ring.

equally divided between boar and sow pigs. During the three years that this sow was under my observation every boar pig to which she gave birth

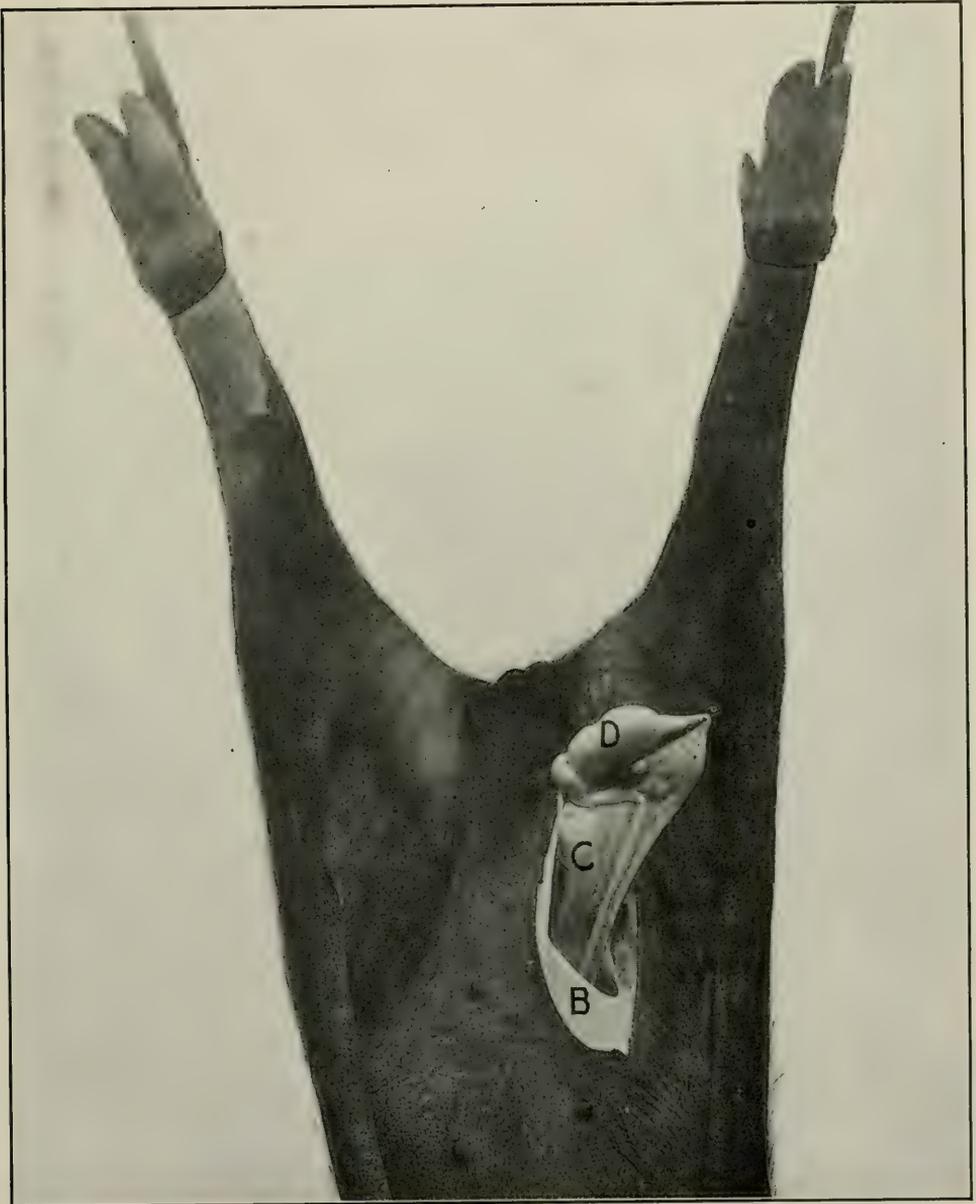


Fig. 92—View of the testicle, spermatic cord and internal abdominal ring. B, Internal abdominal ring; C, spermatic cord; D, testicle.

was ruptured. Twice each year her owner would come, five miles, with the pigs in a market wagon for operation, and strange to say he never lost a pig as a result therefrom.

Objects and Indications—All ruptured boars should be castrated for at least three reasons: (a) To stop their breed in order to lessen the birth of congenitally ruptured pigs. (b) For the same reason that boars are usually castrated, viz.: to increase their usefulness and value for food purposes. (c) In order that they may peacefully commingle with other hogs without exhibiting the natural and acquired sexual habits of the boar.

Most that has been written and published in regard to methods of procedure is vague and some of it misleading. If the operator follows the directions given by some self-denominated authorities—namely, for operation via scrotal incision—he will make a haphazard job and be a monumental failure so far as permanent results are concerned. Since the direct cause for the bowel protruding into the inguinal canal and scrotum is the abnormally large opening of the internal abdominal ring, how can a scrotal operation be expected to correct the trouble? By no known means can the internal abdominal ring be reached by a scrotal incision unless it be by a probe and a very long and small sized probe at that. Since the internal abdominal ring must be closed in order to correct the condition, and since this ring cannot be reached via a scrotal incision, it becomes necessary to operate by an incision immediately over and in close proximity to the ring. This operation we will now illustrate and describe.

Age—At 25 to 35 pounds weight.

Season—Early spring, late fall and winter.

Preparation—Withhold food for twenty-four hours in order to have the alimentary tract empty.

Restraint—Suspended by means of a rope looped above the hocks and attached to a beam above.

Position—Hanging just high enough so that the operative field will be opposite the operators' breast.

Instruments—

1. Miles' hooked castrating knife. (Fig. 25.)
2. Emasculator. (Fig. 80.)
3. Hagedorn No. 3 needle (Fig. 84) carrying 20 inches braided silk No. 12 for suturing the skin incision.
4. Surgeon's full curved needle No. 5 (Fig. 181) carrying a sufficient amount of chromicized catgut (ten-day) to close the internal abdominal ring.
5. Richter's needle-holder. (Fig. 34.)

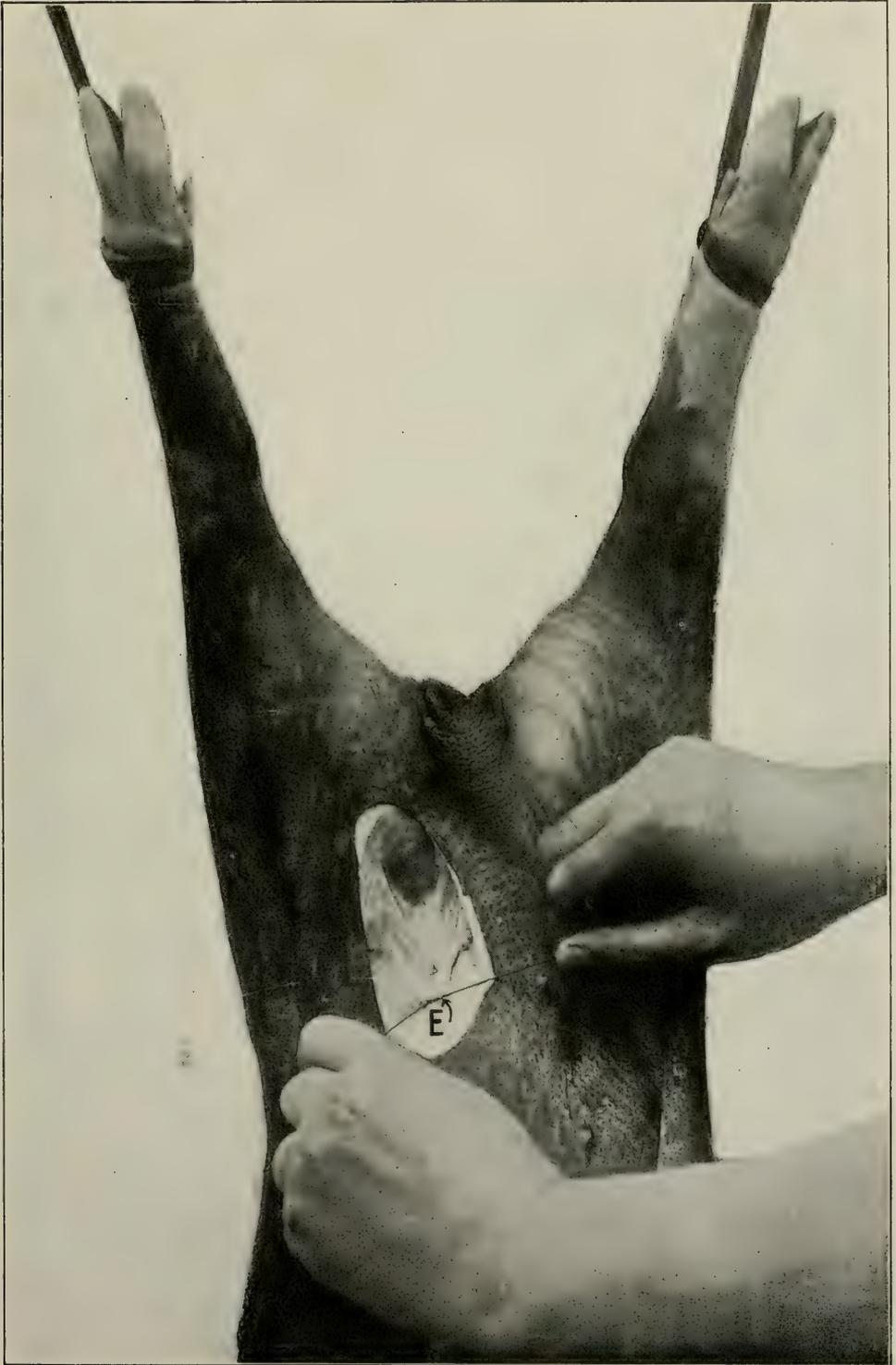


Fig. 93—Closing internal abdominal ring with a purse-string suture.

Sterilization of Instruments, Cleansing Operator's Hands and Operative Field—Same as for castration of the ridgling boar. (See page 106.)

Operative Technic—With the pig in position, the instruments sterilized, hands of the operator and the operative field cleansed and disinfected, proceed as follows: Locate the internal abdominal ring. This can usually be done by pressure applied externally in the inguinal region. With the location of the ring as a land mark, make the incision through the skin

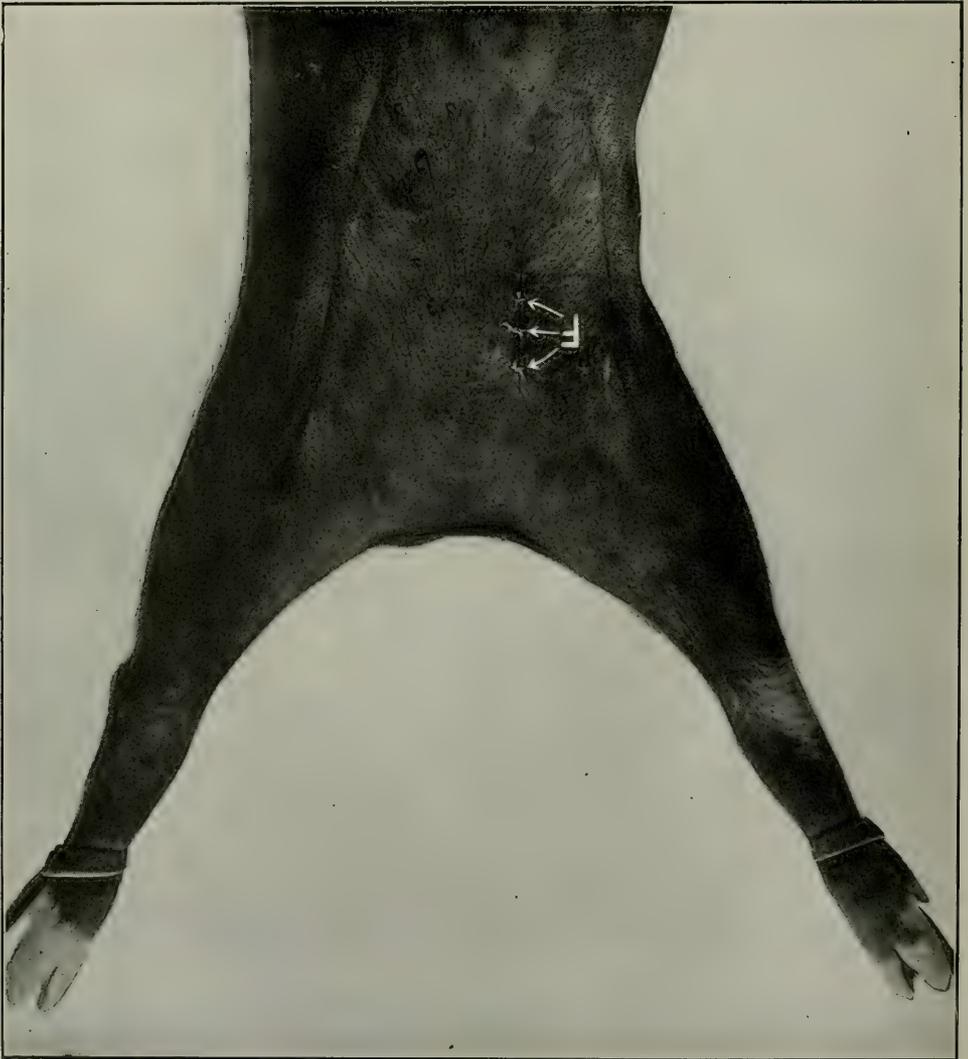


Fig. 94—Operation completed by three interrupted sutures.

and subcutaneous connective tissue down to the muscular coat of the abdominal wall. This incision should be made about three to four inches long and its center should be directly over the center of the internal abdominal ring.

Usually by this time the intestines have—by gravity—returned to the abdominal cavity. The next step is to incise the tunica vaginalis near the ring, exposing the cord. By traction on the cord the testicle can usually be withdrawn from the scrotum, through the inguinal canal and out of the incision. The testicle is now removed by severing its spermatic cord with the emasculator, after which the stump of the severed cord is dropped back into the abdominal cavity. Figs. 91 and 92 afford a comprehensive idea of how the operation has been proceeded with up to this point. By referring to Figs. 93 and 94 you will observe how it is completed. Next we close the inguinal ring by means of a purse-string suture applied in such a manner as to bring the serous surfaces of the peritoneum in close apposition. It is important that the suture be of absorbable material, otherwise it may do damage in the wound.

The skin incision is then easily and quickly closed by three interrupted sutures. (F, Fig. 94.)

Sometimes on account of the small size of the external abdominal ring and inguinal canal it is impossible to withdraw the testicle from the scrotum by traction on the cord. In such cases a scrotal incision is made for the purpose of removing the testicle only. After which proceed to drop the cord into the abdominal cavity and close the ring and skin incision in the usual way.

After-Care—Confine the animal in a small clean pen for ten days; during this period limit the feed. Nature will take care of removing the sutures.

CHAPTER VIII

CASTRATION OF THE RAM

Objects and Indications—The operation is rarely performed upon aged rams. Its greatest application is to lambs. Castration hastens growth and development and improves the character of the mutton and fleece. Cas-



Fig. 95—Restraint and position for castration.

trated rams and lambs are known as wethers, and wethers command a much higher market price than rams. If male sheep are to be raised to full maturity for mutton purposes, they should always be castrated when lambs.

Age—From a week to ten days old is a popular and safe age at which to castrate. However, some prefer operating later. There is no doubt but what the mortality rate following castration rapidly increases with age. For that reason, if for no other, the early operation is most advantageous.

Season—Winter and early spring. Weather conditions play an import-



Fig. 96—Restraint and position for castration of large rams. E, Three feet fixed together; F and G, position of assistant's hands; H, scrotum.

ant part in the success of the operation. Cold rains and sudden drops in temperature should be avoided as much as possible. An extra effort should be made to select seasonable weather.

Preparation—Limited diet for twenty-four hours before operating.

Restraint and Position—A favorite method—both as regards restraint and position—is for the assistant to grasp the legs and place the animal on its rump as shown in Figure 95.

Figure 96 illustrates a satisfactory method of confining large and heavy rams for castration. Both the fore and the right hind legs are fixed together by means of a cord (E). The assistant grasps the left hind leg (F)

and flexes it against his body. With the right hand (G) he controls the head. With a ram in this position the scrotum is readily accessible.

Instruments—1. Williams' castrating knife. (Fig. 2.)

2. Swine and sheep emasculator. (Fig. 80.)

Anatomy—The scrotum is decidedly pouch shaped and possesses a distinct constricted neck at its summit. The skin of the scrotum is covered by short, dense wool. The testicles are similar in shape to those of the bull, and their long axis is almost vertical. In comparison to the size of the



Fig. 97—Testicle of a ram. L, Globus major of epididymis; M, testes; N, spermatic cord.

animal the testicles of the ram are unusually large. The testicle of a 60-pound lamb will weigh as much as the testicle of a 1,400-pound horse.

Sterilization of Instruments and Cleansing Hands of the Operator—Boil the instruments for fifteen to twenty minutes, after which immerse them in a clean vessel containing Lysol or cresolis compound (U. S. P.), one tablespoonful to the quart of water.

Disinfection of Operative Field—The scrotum should be sponged with a pledget of cotton saturated with an antiseptic solution. Cleanliness here

goes far in obtaining successful results. If time is not too limited it is best to clip the wool from the scrotum.

Operative Technic—There are two methods of making the scrotal incisions:

- (a) Lateral, Figure 98.
- (b) End, Figure 99.

In making the lateral or side incision (Figure 98) the left side of the

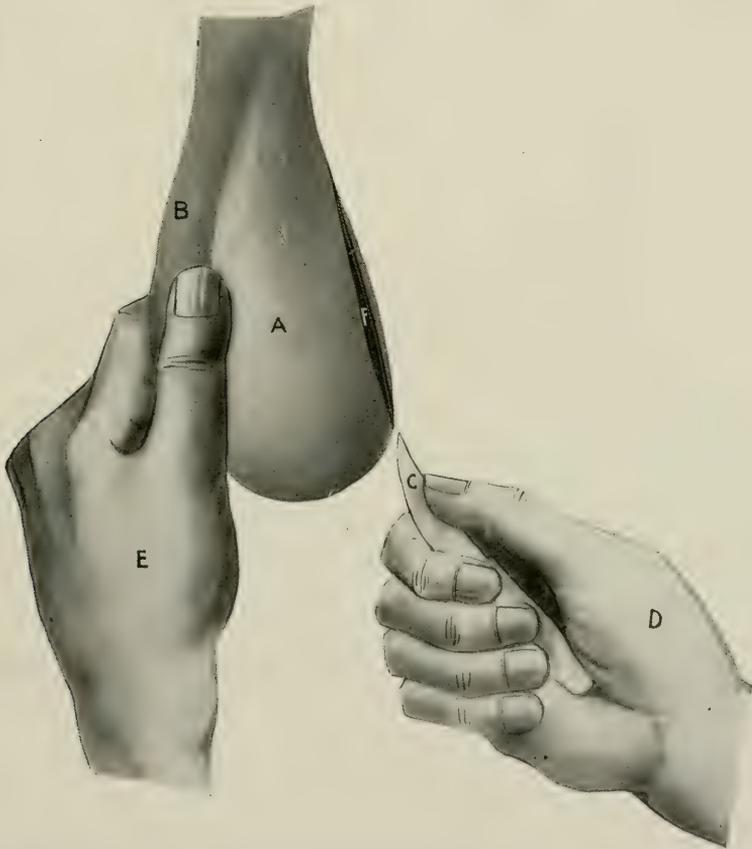


Fig. 98—Lateral incision. A, Right testicle in the scrotum; B, scrotum; C, Williams' castrating knife; E, position of the left hand; F, incision.

scrotum is grasped with the left hand of the operator and sufficient pressure made—by squeezing—to render the skin of the right side tense. With the knife in the right hand, the incision is made by one sweep of the knife through all layers of the scrotum and the testicle itself exposed. This incision should be about three and one-half inches long and should extend well down to the tip. The opposite scrotal incision is made in like

manner. With the right hand grasp the testicles and with the left hand strip the spermatic cords of their coverings until they are well isolated as high as the summit of the scrotum. With the left hand grasp the testicle and make two pounds traction on the cord outward, at the same time applying the emasculator to the cord and forcing it well up near the summit

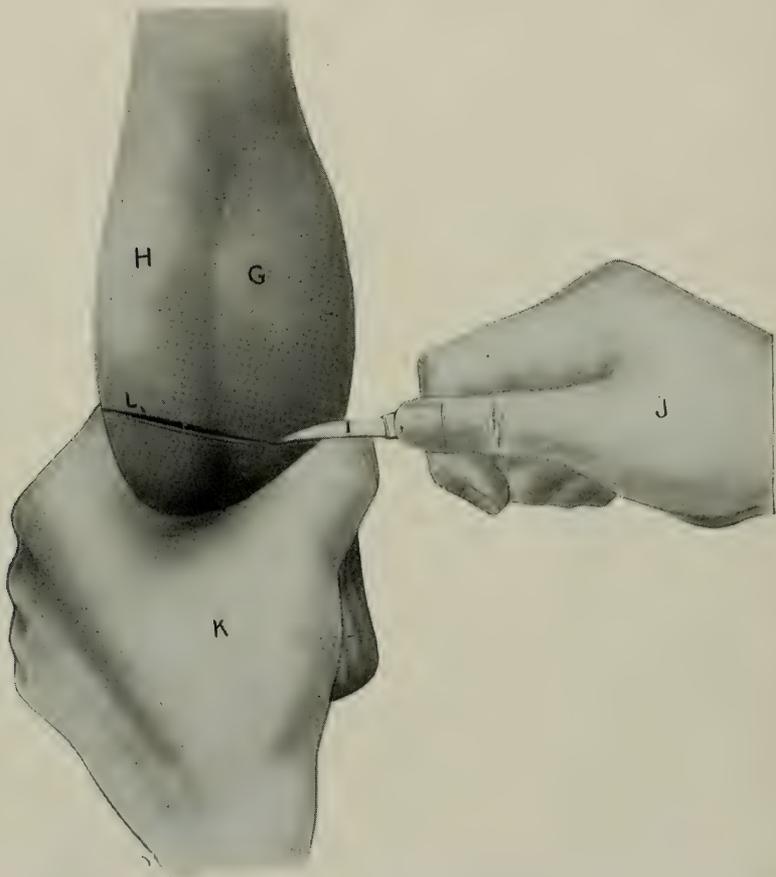


Fig. 99—End incision. H, Left testicle within the scrotum; G, right testicle within the scrotum; I, knife; K, position of the left hand; L, incision.

of the scrotum. Bringing the handles of the instrument together the cord and its coverings are severed.

The end-incision method (Figure 99) has many advantages over the one already described and is to be preferred. Grasp the apex of the scrotum in the left hand and remove one-third of it—by one sweep of the knife. The testicles surrounded by their tunica vaginalis will now drop

down below the incision. By a nick of the knife incise the tunics and expose the testicles, after which grasp them (of course separately) with the right hand and make outward traction, at the same time isolating the cords by stripping them of their coverings to a point near the summit of the scrotum. With the left hand grasp the testicle, at the same time producing two pounds outward traction on the spermatic cord. With the right hand apply the emasculator to the cord and by forcing it well up to the summit of the scrotum sever the cord and its coverings by bringing the

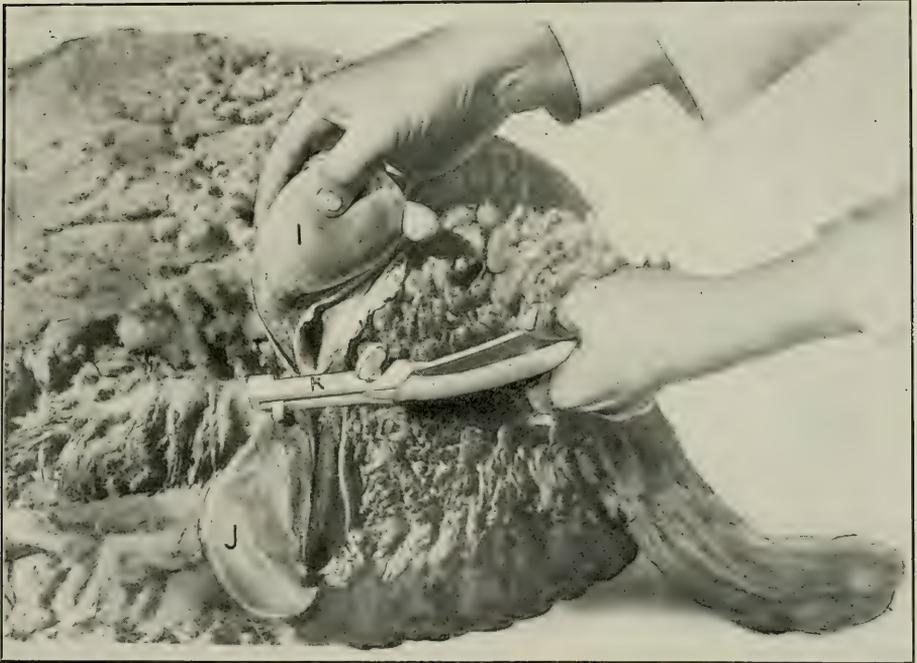


Fig. 100—Severing spermatic cords and their coverings with the emasculator.

handles of the instrument together. Figure 100 illustrates the manner in which the cords are severed with the emasculator.

After-Care—The most essential precaution to be taken after rams and lambs are castrated is to place them in sanitary surroundings, away from danger of wound contamination by barn and barnyard manure and dirt. In favorable weather a pasture is the ideal place. In bad weather a previously cleaned hallway or shed, well bedded with fresh straw, is to be desired. Sheep are quite prone to septic infection, hence to attain successful results infection must be strictly guarded against for several days after castration. Tetanus is a not uncommon sequel to castration of lambs.

Never operate during "fly time."

CHAPTER IX

CASTRATION OF THE DOG.

Objects and Indications—The principal object to be attained in castrating the dog is to deprive him of his nightly habit of visiting the female society members of the canine species in his neighborhood and oftentimes in some other male dog's neighborhood. Castration has the direct and imme-



Fig. 101—Restraint of dog for castration.

diately effect of inducing a male dog to be contented with his home surroundings. The only other reason for castration would be to relieve certain pathological conditions of the scrotum, testicle, inguinal canal and penis.

Age—Dogs may be safely castrated at almost any age. However, the younger the better. Puppies may be easily castrated when four weeks old.

Season—The season plays no important part in castration of the dog. The operation may be done safely at any season.

Preparation—None.

Restraint—Always apply a tape muzzle to begin with. Small dogs may

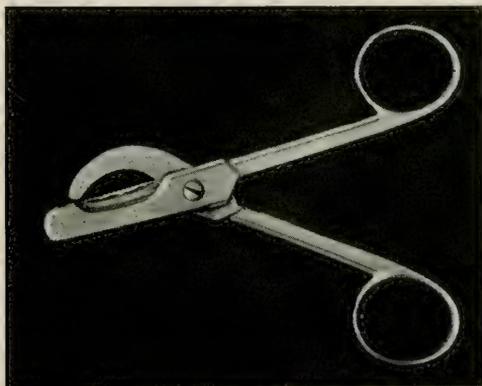


Fig. 102—McKillip's canine and feline emasculator.

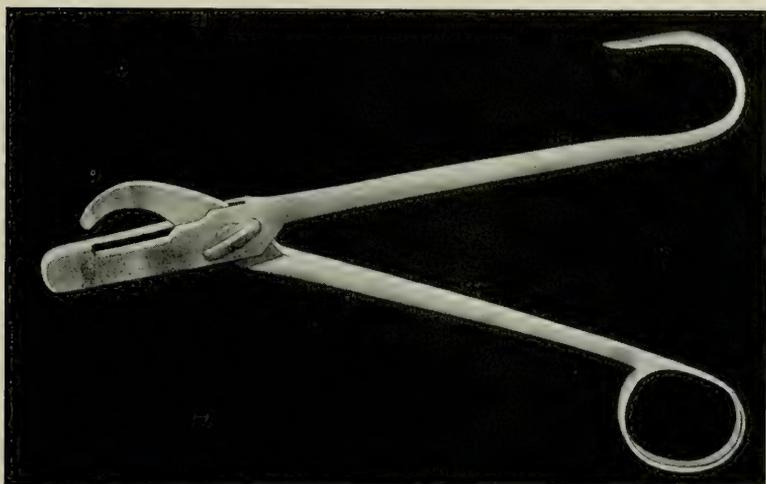


Fig. 103—Canine and feline emasculator.

be easily and safely held by an assistant, as shown in Figure 101. The fore and hind legs are crossed over one another and held tightly. The index fingers of both hands are crossed under the throat and the thumbs are passed back behind the head. Held in this position the scrotum is accessible and the operation may be proceeded with safely.

Large dogs may be held by two or more assistants or they may be secured by tying the legs together as illustrated in Figure 105. The operator should stand out of range of the strong stream of urine which is sure to come as soon as the knife strikes the testicle.

Instruments—1. Williams' castrating knife. (Figure 2.) 2. Canine and feline emasculator (Figures 102 and 103).

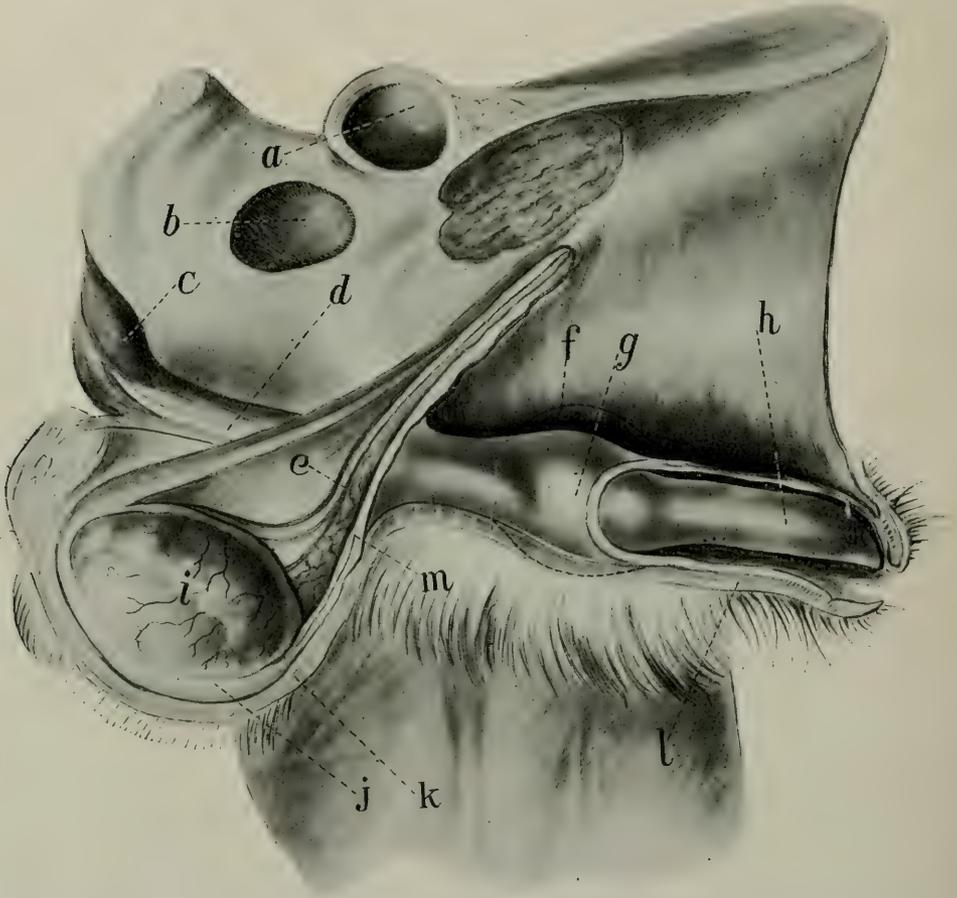


Fig. 104—Genitals of the dog. (Ellenberger-Leisering Atlas.) A, Acetabulum; B, obturator foramen; C, ischio-cavernosum portion, E, vas deferens; F, bulbous glandis; I, testicle; J, tunica vaginalis; K, scrotum; L, prepuce; M, spermatic cord.

Anatomy—The scrotum is suspended below the anus. The raphe or median line is not well marked. The skin covering the scrotum is soft and thin and covered sparsely with short stiff hairs.

Spermatic Cord—The spermatic cord and its covering—tunica vaginalis—are slender in size and long.

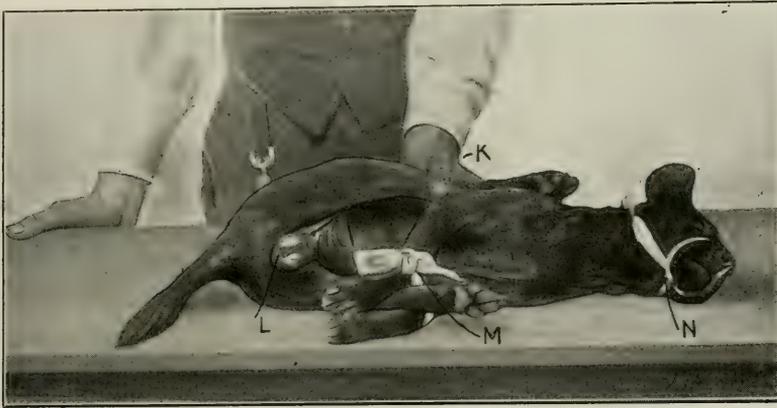


Fig. 105—Scrotal incisions. K, left hand of assistant; L, scrotal incisions; M, legs fixed together with cord; N, muzzle.

Testicle—The testicle is oval in shape and comparatively small. Its long axis is oblique.

Sterilization of Instruments and Cleansing of Operator's Hands—Boil

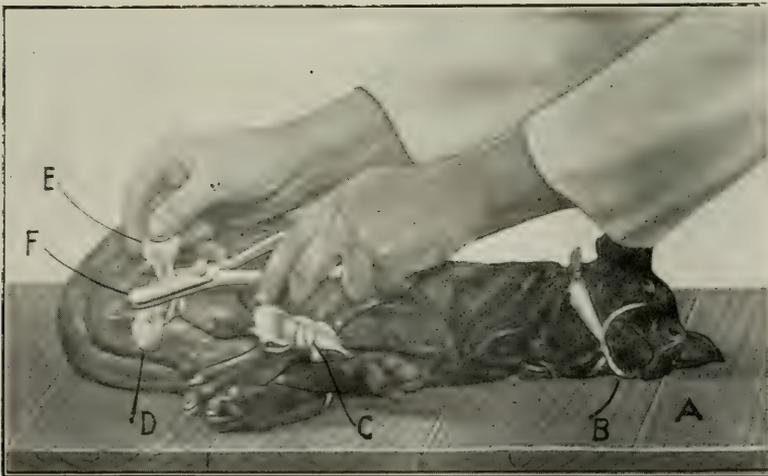


Fig. 106—Severing spermatic cord with emasculator. A, Table; B, muzzle; C, legs fixed together with tape; D, left testicle; E, right testicle; F, emasculator.

instruments for 15 to 20 minutes, and then immerse them in Lysol or cresolis compound (U. S. P.), one tablespoonful to each quart of warm water.

The operator's hands should be thoroughly washed with tincture of green soap and warm water, using a scrub brush, after which wash them in the above mentioned antiseptic solution.

Preparation of Operative Field—If much hair is present on the scrotum

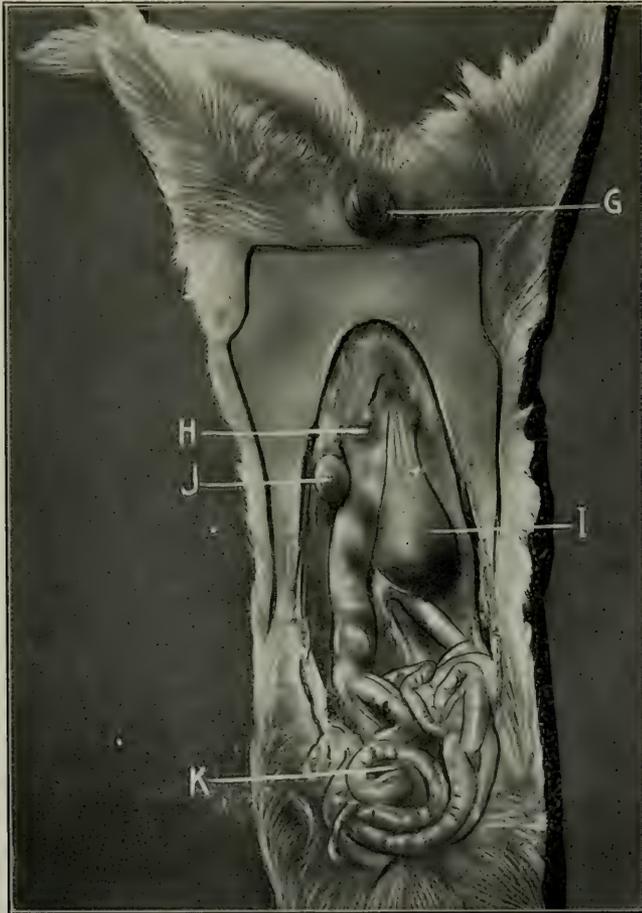


Fig. 107—View of the abdominal organs. G, Descended testicle; H, rectum; I, urinary bladder; J, undescended testicle located in the sublumbar region; K, intestines.

it should be clipped off, after which the scrotum should be washed with an antiseptic solution and painted with tincture of iodine.

Operative Technic—The modus operandi is very simple and the operation requires only a few seconds time. With the left thumb and index finger grasp the scrotum above the testicles and make its skin taut by squeez-

ing. With the knife in the right hand—by two sweeps—the two scrotal incisions are made, exposing both testicles. These incisions should be amply large and extend well down to the lower portion of the scrotum in order to afford free drainage.



Fig. 108—Abdominal incision.

The concluding step (Fig. 106) is to grasp the testicle with the left hand at the same time making slight traction on the cord. With the right hand the emasculator is placed on the cord and forced down close to the scrotal incisions. The cord is then severed by bringing the handles of the instrument together.

After-Care—About all that is necessary is exercise and sanitary sur-

roundings with daily observation for detecting the appearance of the several sequelae of castration.

CASTRATION OF THE CRYPTORCHID (RIDGLING) DOG.

Objects and Indications—On account of the universally recognized fact that cryptorchidism in animals is hereditary, it is very important that such

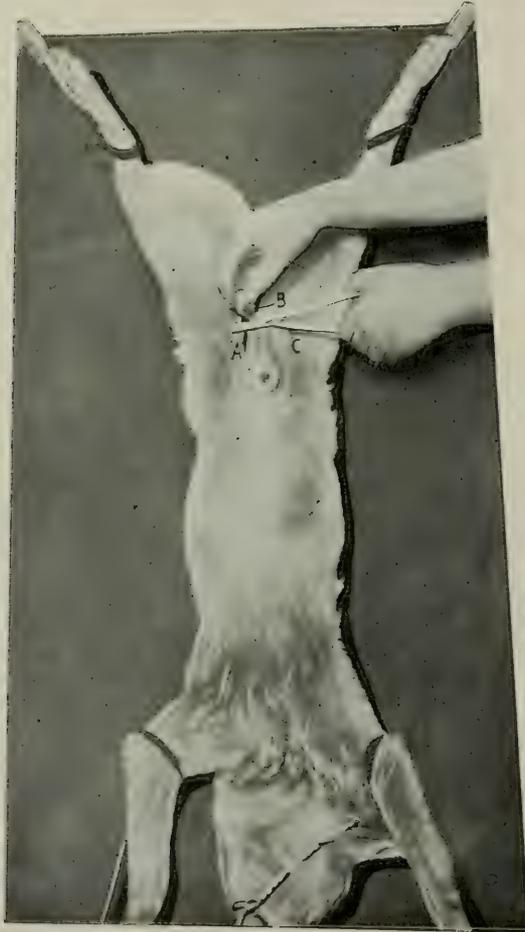


Fig. 109—Severing spermatic cord with the emasculator. A, Incision; B, testicle; C, emasculator.

a dog should not be used for stud purposes. This applies to the cryptorchid with one testicle in the scrotum, since the double cryptorchid is incapable of reproduction. In order to stop the breed of such animals, castration should be resorted to. The operation is also valuable in causing a dog to remain contented at home.

Age—All ages, preferably young dogs.

Season—All seasons.

Preparation—It is essential to have the alimentary tract empty. This is accomplished by withholding food for twenty-four hours previous to operating.



Fig. 110—Incision closed with three interrupted sutures. D, Sutures; E, incision.

Restraint—Preferably on operating table elevated to a perpendicular position, or in the absence of a table the animal may be hung upon a wall or post. In either event the tape muzzle is applied as a protection against bites.

Instruments—1. Miles' hooked castrating knife. (Figure 25.)

2. Emasculator. (Figures 102 and 103.)

3. Richter's needle-holder. (Figure 34.)

4. Surgeon's needle (full curved) carrying 20 inches of No. 12 braided silk for sutures.

Anatomy—A comprehensive idea of the location and relation of the parts concerned in this operation can be had by reference to Figure 107.

Sterilization of Instruments and Cleansing of Operator's Hands—Boil instruments for 15 to 20 minutes, and then immerse them in Lysol or Cresol Compound (U. S. P.) one tablespoonful to one quart of warm water. Wash the hands thoroughly with soap and warm water, using a scrub brush.

Disinfection of Operative Field—Clip or shave the hair from the field of operation, and wash with soap and warm water until the parts are visibly clean. Sponge with antiseptic solution and paint with tincture of iodine.

Operative Technic—If the left testicle is undescended a point is selected to the left of the median line of the abdomen and about midway between the brim of the pelvis and the prepuce (Figure 108).

The incision is made two and one-half inches long—through all layers of the abdominal wall. Through this incision the index finger of the right hand is passed and a search made in the sublumbar region for the spermatic cord. This cord is usually located easily. Withdraw the cord through the abdominal incision and the testicle follows. Sever the cord with the emasculator (Figure 109) and replace its stump in the abdominal cavity. Suture the abdominal incision with two or three through-and-through interrupted sutures. (Figure 110).

After-Care—The dog should be placed in sanitary close quarters for six or seven days; during which period no exercise must be allowed and the diet should be of a light, easily digestible character, and limited. The two end sutures may be removed on the third day and the middle one on the fifth day.

CHAPTER X

CASTRATION OF THE CAT.

Objects and Indications—In order that they will remain contented at home.

Age—The operation can be performed safely at any age.

Season—All seasons.

Preparation—Same as for castration of the dog.

Restraint—Remember that a cat will scratch as well as bite and the operator should take the necessary precautions to protect himself from both.

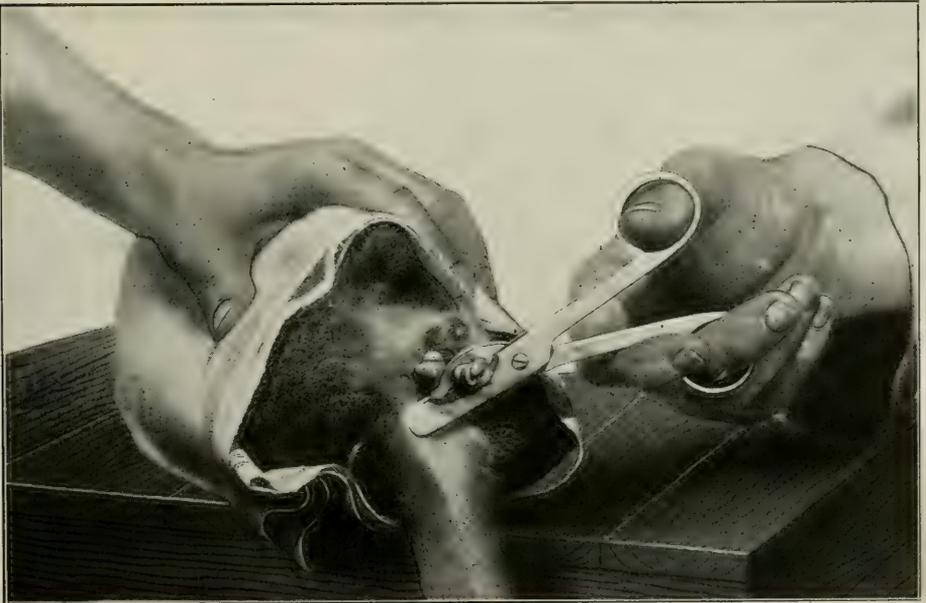


Fig. 111—Castration with the cat wrapped in a towel.

Two favorite methods of restraint—either of which is satisfactory—are as follows.

(a) With all four feet tucked up against the abdomen, wrap the animal in a towel, leaving its posterior parts exposed. (Figure 111.)

(b) Place the animal in an ordinary rubber boot with its hind legs thrust through the finger straps. See Figure 112.

Position—Dorsal.

Instruments—Same as for castration of the dog. See page 124.

Anatomy—Similar to that of the dog.

Sterilization of Instruments and Cleansing Operator's Hands—Same as for castration of the dog. See page 125.

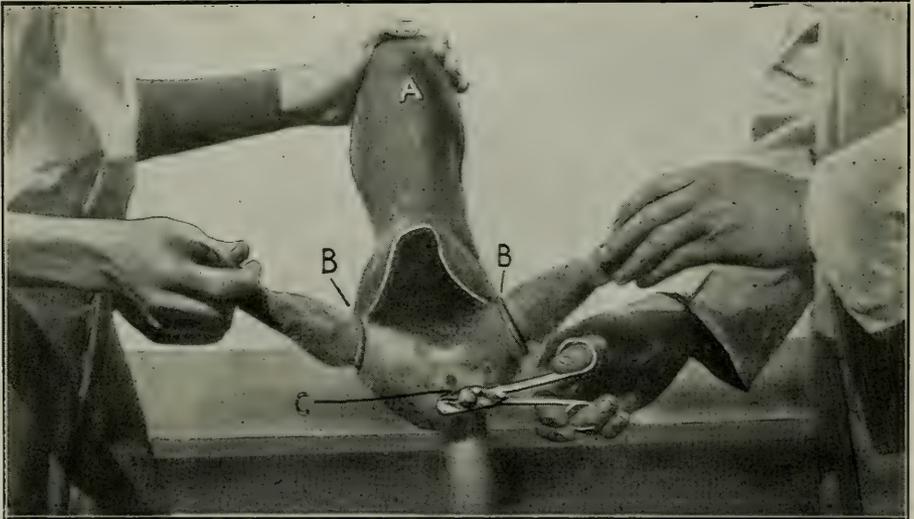


Fig. 112—Castration with the cat confined in a rubber boot. A, Boot; B, B, finger straps; C, severing the spermatic cord with an emasculator.

Preparation of Operative Field—Same as that for castration of the dog, with the exception that special pains must be taken to see that the hair is removed from the scrotum. See page 126.

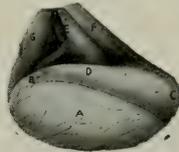


Fig. 113—Testicle of a cat after removal.

Operative Technic—Same as for castration of the dog. See page 126.

After-Care—Daily observation for the appearance of the sequelae of castration.

CHAPTER XI.

CAPONIZING.

Definition—Caponizing is a term applied to castrating fowls. In this country the operation is practiced almost exclusively on male chickens (roosters, cockerels), and sometimes on male turkeys (toms, gobblers). Such fowls when castrated are known as capons. The capon bears the same rela-

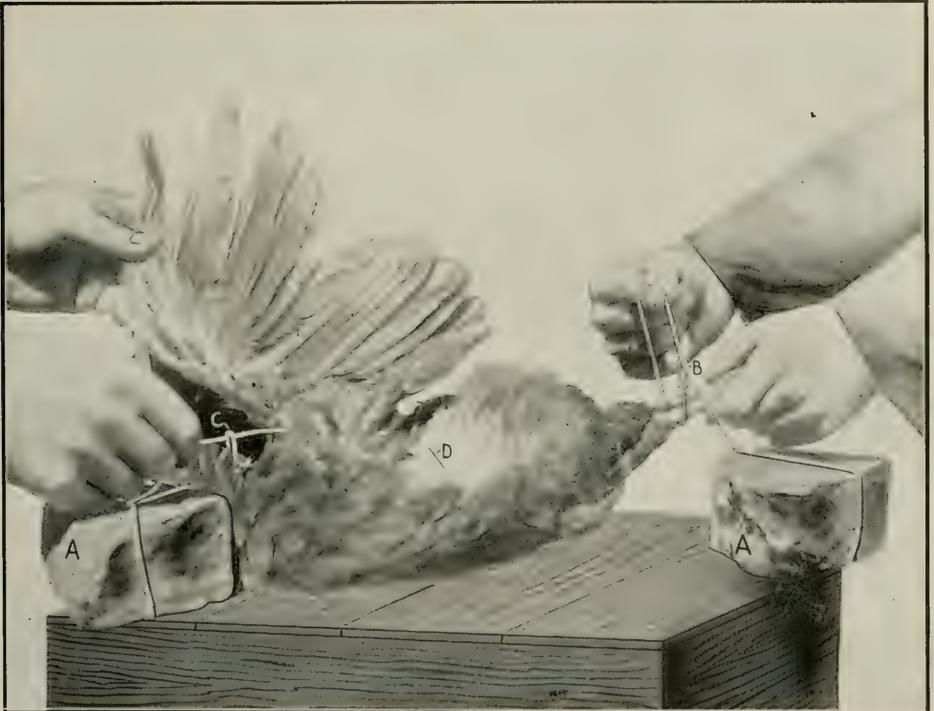


Fig. 114—Restraint of the fowl for caponizing. A, A, Weights at the ends of the cords; B, cords looped around the legs; C, cord looped around the wings.

tion to the rooster that the steer does to the bull, the barrow to the boar, the gelding to the stallion, etc.

History—It is impossible to say just how long the operation of caponizing has been performed. It seems quite certain, however, that the practice was familiar to the Chinese more than two thousand years ago. Later it was practiced by the Greeks and Romans and through medieval times, by the people of middle and southern Europe, and in recent years it has been

introduced into America. At present capons are most universally known and appreciated in France; it is only within the last few years that the business of producing them has advanced rapidly in this country. The industry is largely confined to that portion of the United States east of Philadelphia, though increasing numbers of capons are being raised in the North Central States. During the winter months, capons are regularly quoted in the markets of the larger eastern cities. Massachusetts and New

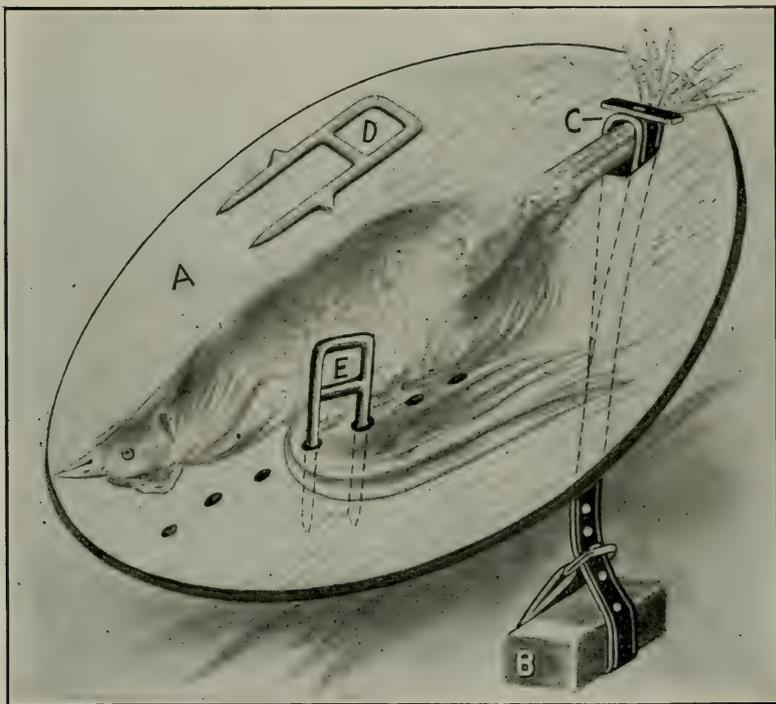


Fig. 115—Caponizing board. A, Board; C, feet imprisoned in strap loop; B, weight on end of strap; E, wings imprisoned in staple.

Jersey are the great centers for the growing of capons, while Boston, New York and Philadelphia are the great markets.

Objects and Indications—Caponizing changes a male chicken's disposition to the extent that he no longer shows an inclination to fight; he becomes sluggish and quiet and more docile. The true capon never crows. The comb and wattles cease to grow. His society is not sought by other chickens—either cocks or hens—he becomes an outcast and on this account oftentimes takes up with baby chicks even to the extent of "mothering" them, scratching and working for them by day and hovering them by night. On account of the more peaceful disposition of the capon his body

develops rapidly, and he grows larger and takes on fat more readily than the ordinary male bird. Caponizing improves the texture of the flesh, and it is now a well recognized fact that the flavor and texture of the flesh of a capon is as much improved over that of a cock as the meat of a steer

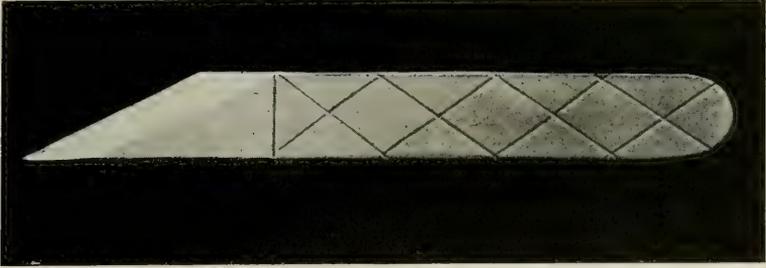


Fig. 116—Miles caponizing knife.

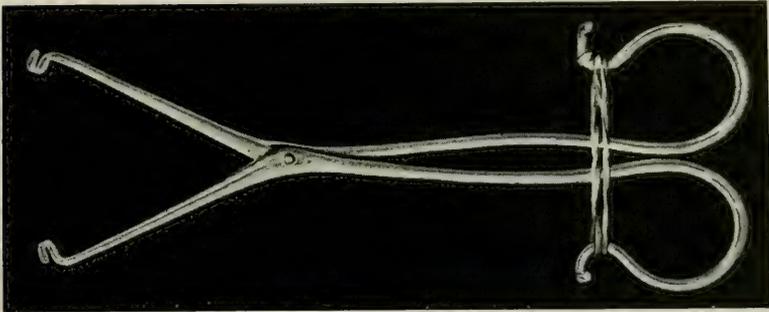


Fig. 117—Miles' spreaders.

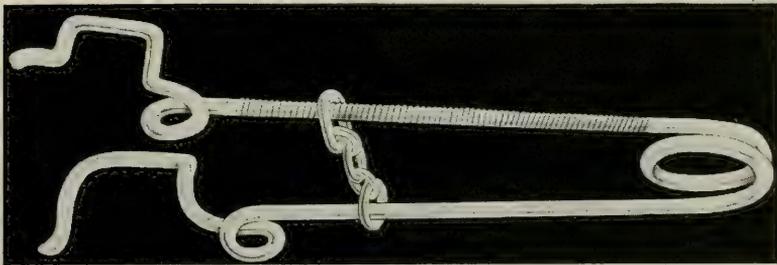


Fig. 118.—Spring spreader.

is over that of a bull. Hence capons are entitled to and do command a higher market price than either cocks or hens. Capons are less trouble to care for and to keep within prescribed bounds than other chickens. The economic value of caponizing justifies its more general practice.

Selection of Breeds—Always select birds from the large breeds for ca-

ponizing, viz: Light Brahmas, Cochins, Plymouth Rocks, Langshans, Wyandotts, Orpingtons, etc.

Age—Two or three months is the best age at which to operate. The chicken should weigh from one and one-half to two pounds. Never operate

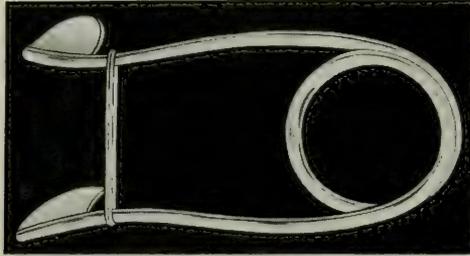


Fig. 119—Wire spring spreader.

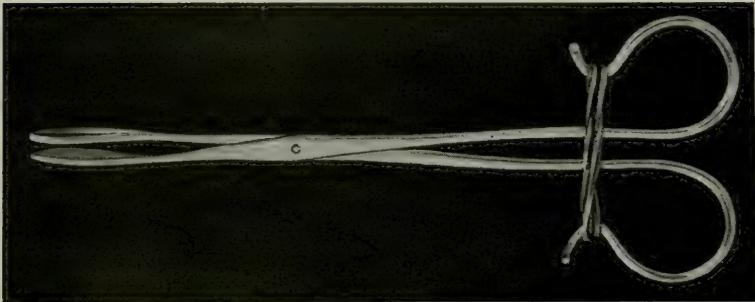


Fig. 120—Miles' forceps.



Fig. 121—Scoop and hook.

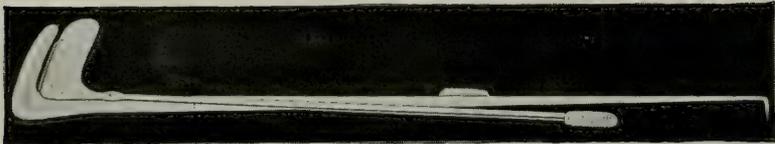


Fig. 122—Clipping knife, scoop and hook.

after the bird is five months of age. The mortality is low in young fowls and increases with age.

Season—Summer—June, July and August.

Restraint—The most economical and at the same time most satisfactory

method of restraint is illustrated in Figure 114. With a barrel or box used as an improvised operating table one cord is looped around the wings and another around the legs. The length of these cords depends upon the size of the box or barrel being used. To the free end of each cord a weight—one half brick—is attached. The fowl is now placed on the table and the weights produce sufficient traction on the cords to hold it in proper position.

Another method of restraint favored and used by some is a specially constructed board. See Figure 115. It will be observed that a self-locking

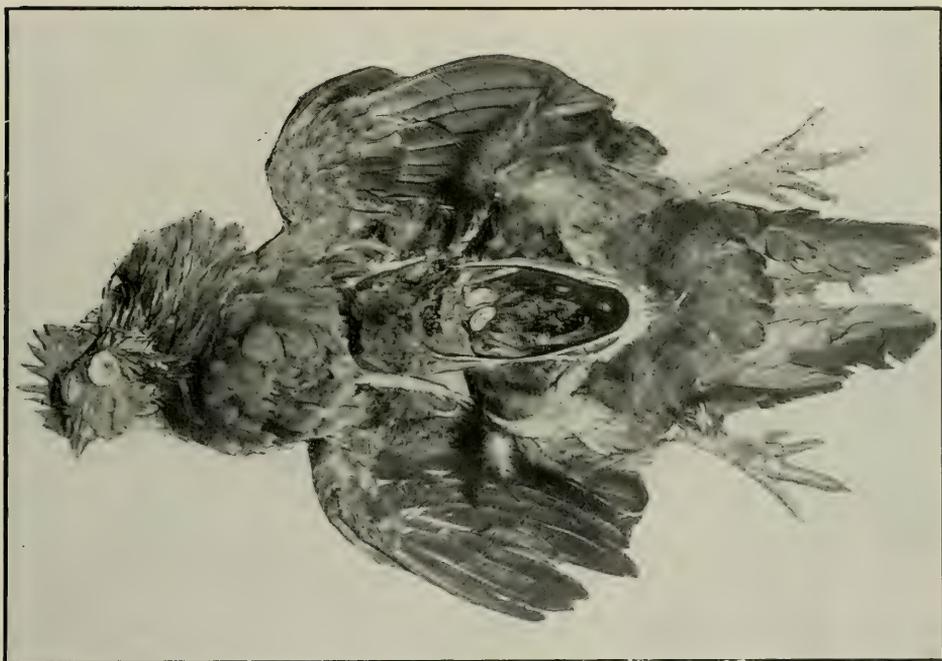


Fig. 123—Testicles of the fowl.

staple is used to confine the wings, while the legs are confined by a loop strap with a weight suspended at its end. The holes through the board make it adjustable to all sizes of fowls.

Instruments—Several different styles and kinds of instruments for performing the caponizing operation are on the American market. Most of them are satisfactory after the operator becomes accustomed to handling them. They consist of:

1. Knife for making abdominal incision. (Fig. 116.)
2. Spreaders or retractors for separating the ribs. (Figs. 117, 118 and 119.)

3. Appliances for removing the testicle (Figs. 120, 121, 122.)

Some of the best of each of these are illustrated below. The operator should make his own selection. The author's preference is the "Farmer" Miles set.

Anatomy—The testicles are situated in the abdominal cavity. They are small, bean-shaped, soft, very friable and light colored. Their location is on each side of the vertebral column immediately behind the lungs and in

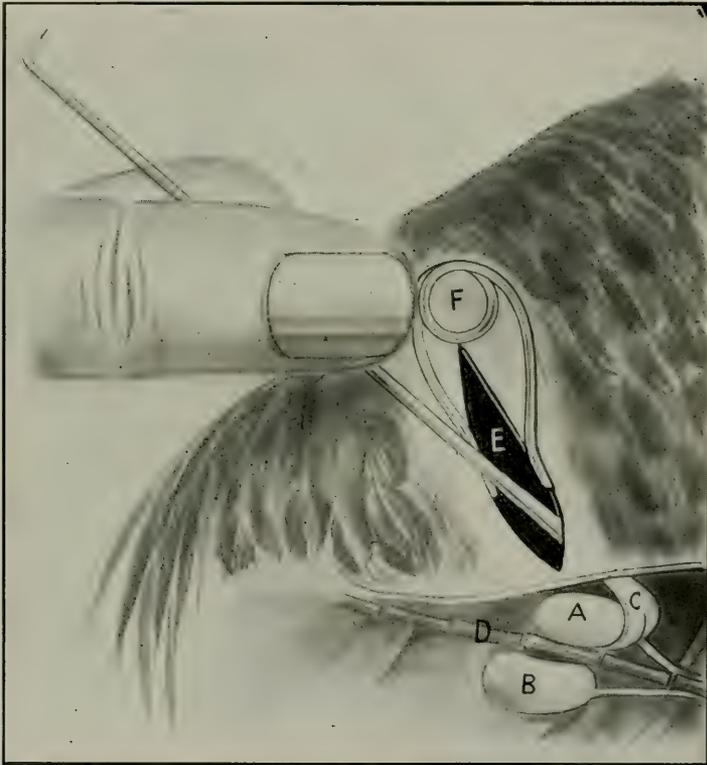


Fig. 124—Diagrammatic illustration showing position of testicles of the fowl and the method of removal. A, Right testicle; B, left testicle; C, scoop applied to the spermatic cord; D, vertebral column; E, incision in last intercostal space; F, spreader.

front of the kidneys. See Figure 123. They are opposite the last intercostal space. Above them is the aorta and vena cava.

Preparation—The most essential step connected with caponizing is to have the fowls entirely empty at the time of operating. This is accomplished by withholding food and water for thirty hours. Never attempt to operate upon a "full" chicken unless you are looking for trouble.

Operative Technic—Unless a satisfactory artificial light is available, the

proper time of day at which to operate is between the hours of 10 a. m. and 2 p. m., as at this time the sun is high and in proper position to reflect its bright light into the abdominal cavity. Good light is one of the essentials. Never attempt to operate without it. With the fowl properly confined and in such a position as will enable the sunlight to illuminate the abdominal cavity—operate out of doors—instruments and hands of the operator clean, proceed as follows:

1. Pluck the feathers from the field of operation.
2. Chill the parts by pouring a glass of ice water slowly over the skin.

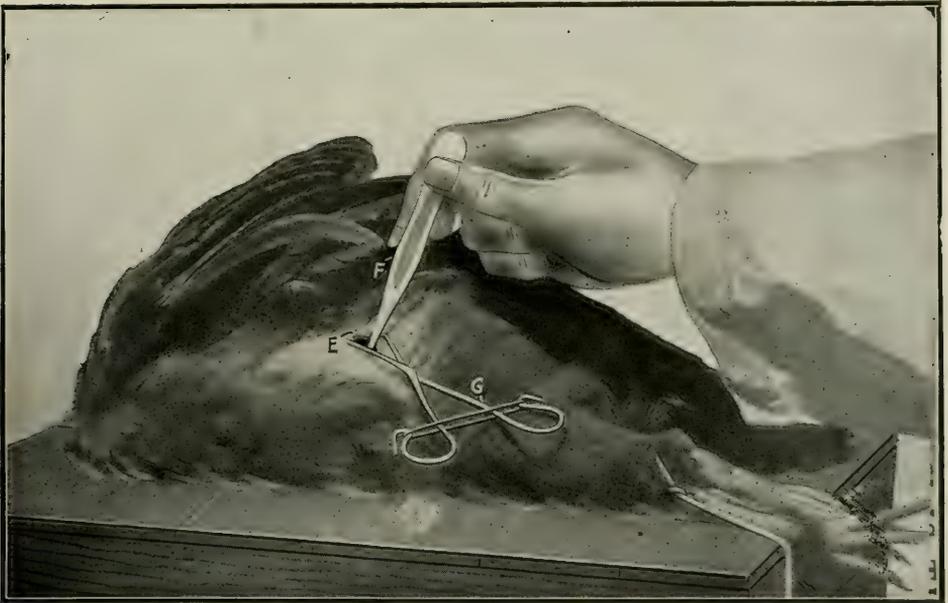


Fig. 125—Removing the testicle with a scoop. E. Abdominal incision in last intercostal space; F, scoop applied; G, spreaders applied.

This chilling process has a good influence in preventing cutaneous hemorrhage.

3. Make an abdominal incision with the knife by incising the muscles in the last intercostal space (between the last two ribs). Since the intercostal artery passes along the posterior border of the ribs, this incision should closely follow the anterior border of the last rib. The first incision includes all layers of the abdominal wall with the exception of the peritoneum.

4. Insert the spreaders and spread the ribs apart sufficiently to admit the scoop or forceps.

5. Nick the peritoneum. This will open the abdominal cavity.

6. The testicles are now located and if both are to be removed through

one abdominal incision, the lower one should be removed first, otherwise the hemorrhage incident to removing the upper one would interfere with the removal of the lower. There is no serious objection to operating from both sides, in which event the upper testicle is removed first.

With a scoop or forceps applied to the spermatic cord—care being taken not to include the aorta or vena cava—the testicle is removed by twisting the cord with several turns of the instrument. Be sure and remove the entire testicle, for if any portion of it is left the fowl will crow, and be what is known as a “slip.” Slips are not capons and are undesirable.

7. Remove the spreaders. This allows the ribs to come together and close the abdominal wound. If a mistake has been made by severing either



Fig. 126—Removing testicle with Miles' forceps. J, Spreaders applied; K, forceps applied; L, abdominal incision.

aorta or vena cava the fowl will die in a very few minutes from internal hemorrhage. Should this occur the fowl may be used for food.

On account of the almost complete immunity of the chicken from septic infection, healing of the wound usually takes place by first intention, and the fowl makes a quick and satisfactory recovery.

After-Care—Upon being released from the operating table the capons are usually put in a closed yard where they can find shelter, food and water and can be kept quiet. No roosts are provided, as the less flying and jumping they do the sooner the wound heals. The capons seem to be very little

inconvenienced by the operation, and water and soft feed mixed with sweet skim milk may be given immediately. Some feeders give this in unlimited quantity; others feed more sparingly for a time.

For a week or ten days the newly made capons should be carefully observed to see whether they become "wind puffed." This is a condition caused by air gathering under and puffing out the skin near the wound. When observed it can be readily relieved by pricking the skin with a needle or knife and pressing out the air.

Mortality—About one to two per cent.

PART II.

SPAYING.

Synonyms—Ovariectomy, Oophorectomy, Ovariotomy.

Definition—Spaying is a term applied to the operation of unsexing the female domestic animal.

CHAPTER I.

MARE SPAYING.

Objects and Indications—The principal indication for removing the ovaries from mares is to correct the disagreeable and dangerous condition known as nymphomania, the symptoms of which are as follows: Usually when such animals are touched, especially while applying harness and



Fig. 127—Restraint for spaying in the standing posture.

saddles, they squat, switch their tails, kick, bite, urinate, etc., while at the same time the clitoris moves actively, as during estrum. Some nymphomaniac mares are affected with such behavior continuously, while in others it is periodical. The intensity also varies in degree in different individuals. Some are affected to the extent of actual viciousness. Such animals are a public and private nuisance, undesirable to own and dangerous to the attendant. Removal of the ovaries usually corrects the trouble. The results

of the operation are not immediate. In fact, even apparent improvement may not be noted until several weeks—possibly months—have elapsed. The improvement is gradual and oftentimes slow, even after it actually begins. Spaying is always justified in mares of this class.

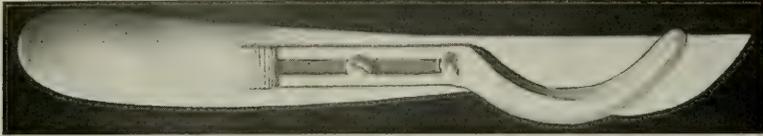


Fig. 128—Colin's scalpel.

Age—Spay regardless of age when operation is indicated.

Season—Spring, winter and fall.

Preparation—It is necessary for the intestinal tract—the rectum in particular—to be empty. This is usually accomplished by withholding feed for



Fig. 129—Williams' ratchet spaying ecraseur.

thirty hours previous to operating. To make sure that the rectum is empty it is well to administer an enema immediately before operating. Douche the vagina and wash the anus, vulva, tail and surrounding parts with Lysol or cresolis compound (U. S. P.), one tablespoonful to each quart of water. Bandage the upper one-third of the tail. Chloral or Cannabis Indica ad-

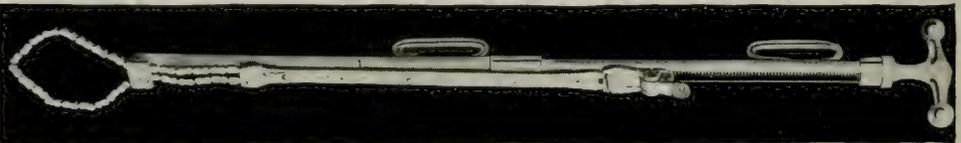


Fig. 130—Dunn's spaying ecraseur.

ministered thirty or forty minutes before operating is helpful in most instances.

Position—Standing.

Restraint—If a suitable operating stock is available it should be used. In lieu of stocks a narrow box stall and slings are the next best method of

restraint for the spaying operation. When a narrow stall and sling are used it becomes necessary to confine the hind feet in such a way that the operator is not subjected to the danger of kicks. The simplest method which will answer the purpose is illustrated in Figure 127. It consists of the nose twitch applied and held by an assistant; also an eighteen-foot three-quarter inch cotton rope and one hobble strap. Loop the end of the rope around the off hind pastern, pass it through the D-loop or ring of the near hind, then upward and forward between the fore legs, over the withers and under the main rope behind the elbow. Another method is the hippo lasso. (Figs. 135 and 136.)

While the last two methods described are simple and will answer the purpose, there is at least one quite serious objection to them, viz: The animal may in her struggles cast herself, or she may voluntarily lie down, which greatly interferes with the progress of the operation. Whenever possible it is always advisable to fortify yourself against the animal lying down by placing her in a sling. Restraint as illustrated in Fig. 127, supplemented by a sling, is very satisfactory.

Instruments—1. Colin's scalpel (Fig. 128) is decidedly the most satisfactory knife for vaginal spaying. This knife has a heavy blade with wide belly guarded by an easily manipulated sliding shield. A knife thus constructed can be safely handled inside the vaginal canal.

2. Williams' ratchet spaying ecraseur (Fig. 129) is so constructed that it takes up very little space in the vaginal canal, and is sufficiently long to reach the ovaries of the largest mare or cow. The ratchet handle enables the operator to manipulate the instrument with one hand while the other hand remains in the cavity. If an extra assistant is available to handle the instrument on the outside, Dunn's spaying ecraseur (Fig. 130) is an excellent instrument.

3. Vaginal spaying speculum. There are two satisfactory spaying speculums now on the market. A. Williams' speculum (Fig. 133); B. Pasley's speculum (Fig. 134).

Anatomy—In order to spay mares satisfactorily it is essential that the operator have a general idea of the anatomy of the vulva, vagina, uterus and ovaries. Lack of space here forbids going into minute detail. However, the more important points will have attention.

Vulva—The vulva is the external opening of the genital and urinary tracts. It is an ovoid slit situated in the perineal region below the anus, and consists of two lips and two commissures. The space between the vulva below and the anus above is the perineum. In a depression on its floor (*fossa navicularis*) lies the clitoris. In virgin mares the hymen separates the vulva from the vagina. Inside, on the floor of the vulva, opens the *meatus urinarius*, which is the outlet from the bladder. The mucous

membrane lining the vulva is rose colored, and the skin covering it externally is soft, thin and devoid of hair.

Vagina—The vagina is situated between the rectum and bladder, and is tubular in shape. It extends horizontally through the pelvic cavity from

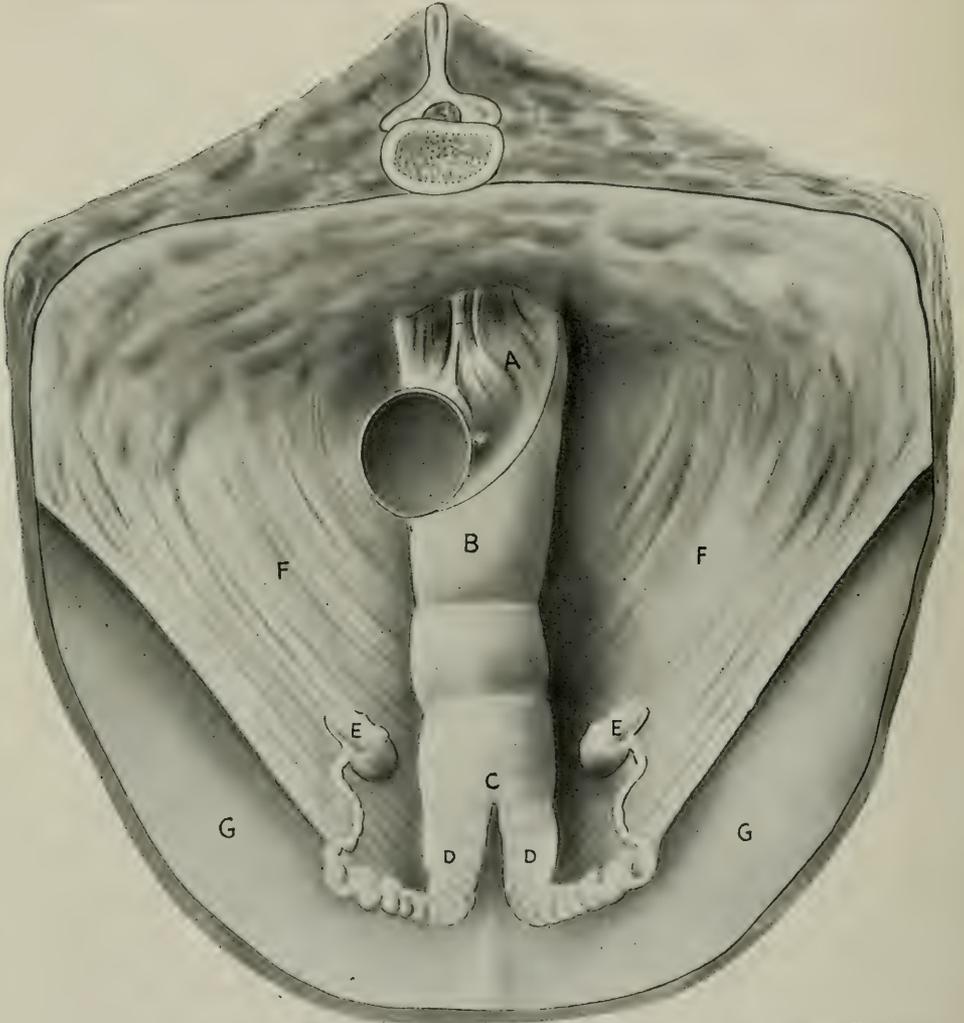


Fig. 131—View of internal genitals of the mare. A. Rectum; B. vagina; C. uterus; D. D. cornua; E. E. ovaries; F. F, broad ligaments; G, G, abdominal walls.

the cervix to the vulva. Its walls are capable of great distention. The vagina varies in length in different individuals. It is usually from eight to ten inches long. Superiorly it is related to the rectum, inferiorly to the bladder, laterally to the pelvic wall.

Uterus—The uterus is a musculo-membranous sac situated partly in the pelvic region. It consists of a body and two cornua. Superiorly it is related to the rectum, which passes between its horns while it is suspended laterally by the broad ligaments. Inferiorly it is related to the bladder and convolutions of the intestines. Its anterior extremity is known as the fundus, and is continuous with the cornua. Its posterior extremity is continuous with the vagina, constituting the cervix or neck of the uterus. The cervix is round, hard and thick. In its center is a tube-like opening (fissure). The cornua spring laterally from the anterior extremity of the uterus and pass upward and forward, and to these the suspensory ligaments are attached. At their summit the fallopian tubes enter. The uterus



Fig. 132—External and internal genital organs of the mare. B, Vagina; C, cervix (neck of womb); D, D, horns and fallopian tubes; E, E, ovaries; F, fundus.

has three openings, viz: the ostium internum leading through the cervix, and the ostium uterinum at the end of each horn.

Fallopian Tubes—These are prolongations of the uterus, their purpose being the conveying of the ovum from the ovaries to the uterus. They are ten to twelve inches long and extend from the ovaries above to the cornua below. At the upper outlet of the fallopian tubes is the fimbriated extremity, which is funnel-shaped and receives the ovum direct from the ovary.

Ovaries—The ovaries are bean-shaped and weigh from one to three ounces. They are situated in the sublumbar region of the abdominal cav-



Fig. 133—Williams' spaying speculum, showing the hand and knife in position for making the vaginal incision.

ity about four to five inches behind each kidney. They hang about two to three inches to each side of the center of the vertebral column. They are attached above in the sublumbar region by the anterior part of the broad ligament. In old animals the ovaries are usually hard and fibrous. How-



Fig. 134—Paseley's spaying speculum, showing position of the hand and the knife for making the vaginal incision.



Fig. 135—Mare confined by hippo lasso. A, Right hand carrying Coin's scalpel; B, left hand manipulating spaying speculum.

ever, cysts are by no means uncommon. The ovarian artery supplies nutrition to the ovary.

Warning—The rectum must be empty, otherwise it is liable to injury from the point of the knife when it is thrust through the vaginal roof. In

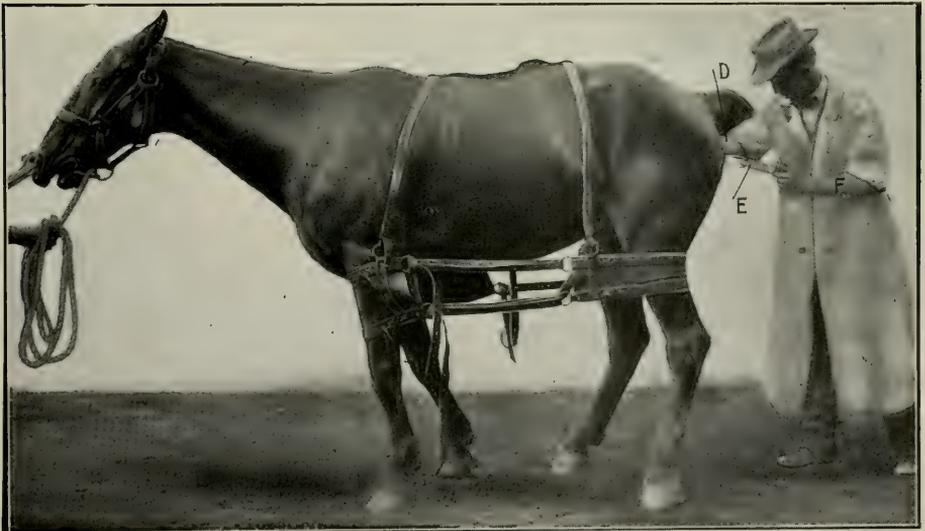


Fig. 136—Removing the ovaries. E, Spaying ecraseur.

making the incision be sure to press the cervix downward and forward with the spaying speculum in order to get the site of incision away from the rectal wall.

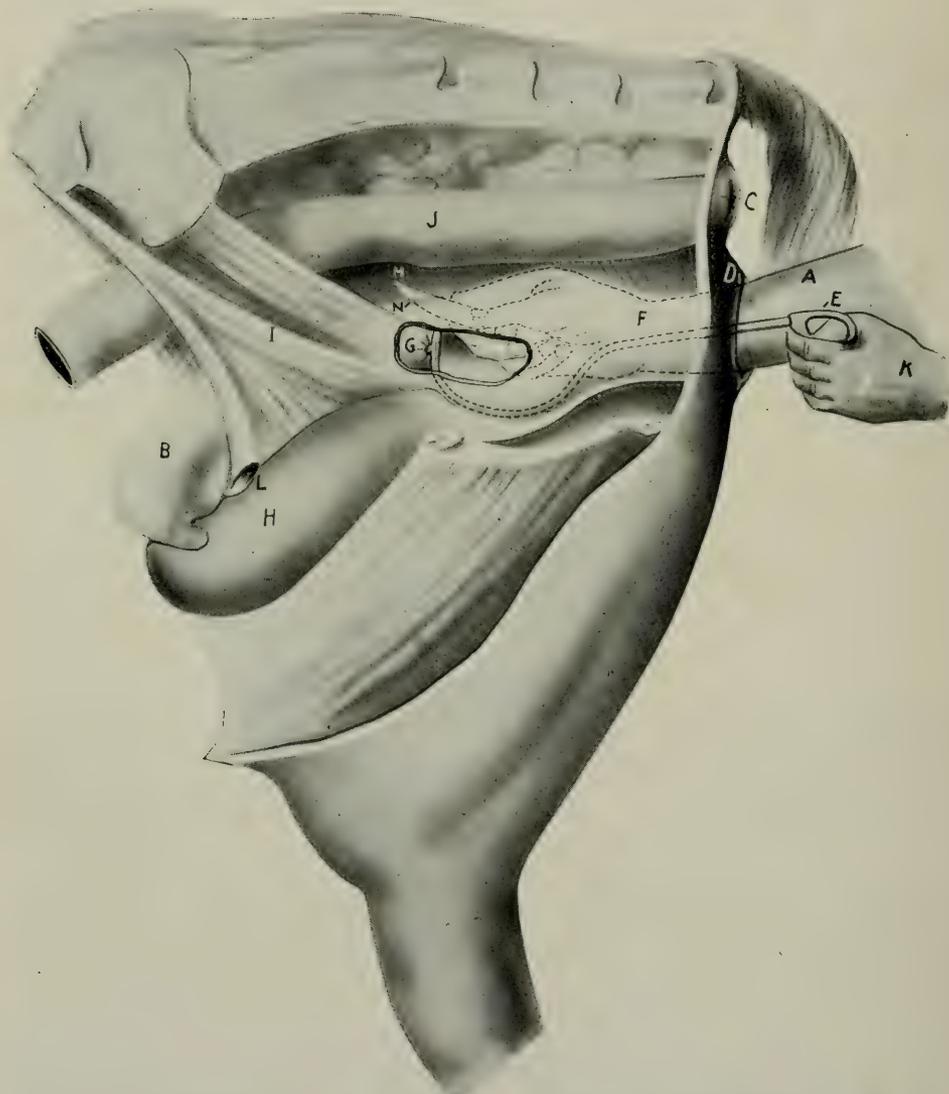


Fig. 137—Making the vaginal incision. A, Position of right hand and arm; B, uterus; C, anus; D, vulva; E, spaying speculum; F, vagina; G, cervix; H, urinary bladder I, broad ligament; J, rectum; K, position of left hand; L, left ovary; M, location of knife thrust through the roof of the vagina; N, vaginal incision.

Sterilization of Instruments and Cleansing Operator's Hands—The instruments should be boiled for fifteen to twenty minutes, after which place

them in Lysol or cresolis compound (U. S. P.), one tablespoonful to each quart of water. The operator's hands should be thoroughly washed with

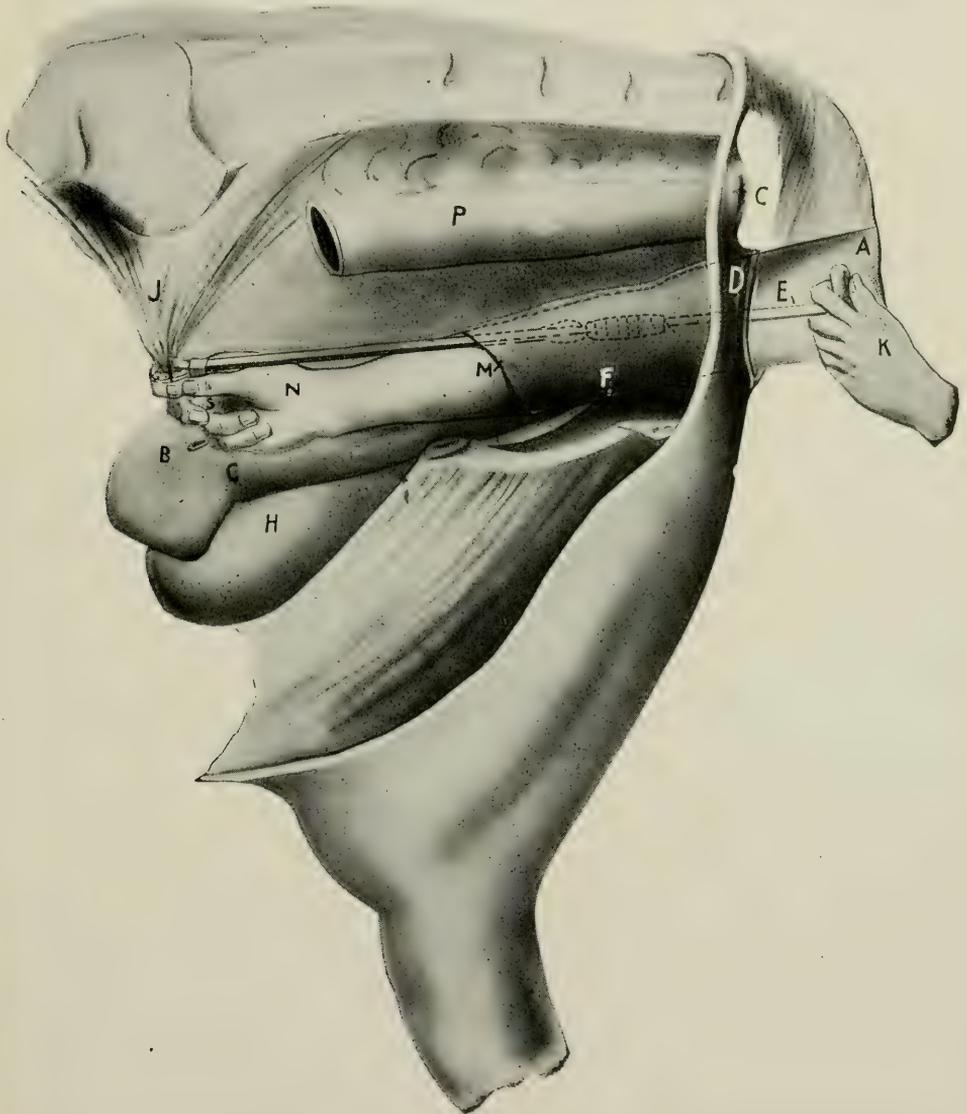


Fig. 138—Removing the ovary with the ecraseur. A, Position of the right arm; B, uterus; C, anus; D, vulva; E, ecraseur; F, vagina; H, urinary bladder; J, broad ligament; M, vaginal incision; N, right hand; P, rectum; S, ovary.

tincture of green soap, using a scrub brush, and then with the above mentioned antiseptic solution.

Operative Technic—1. With the right hand lubricated with surgical jelly,

carry the spaying speculum (Figs. 133 and 134) into the vagina, and insert its tip into the cervix (neck of womb).

2. Withdraw the hand, and with Colin's scalpel reenter the vagina.
3. With the left hand elevate the handle of the speculum and make sufficient pressure downward and forward to stretch the roof of the vagina.
4. With the blade guarded it is pressed against the roof of the vagina directly over the cervix.
5. Unguard and thrust the blade through the roof of the vagina. (Fig. 137).
6. Reguard the blade and withdraw the knife, at the same time withdrawing the spaying speculum.

7. With the right hand re-enter the vagina and enlarge the opening by stretching with the fingers until the whole hand enters the abdominal cavity.

8. Introduce the ecraseur and locate and sever the ovaries from their attachment, by placing a loop of the chain above the ovary, and with the left hand the ratchet handle is manipulated back and forth until the broad ligament is severed. Withdraw the ovary from the abdominal cavity and drop it in the vagina. The opposite ovary is then removed in like manner, after which withdraw both ovaries and the ecraseur. The operation is now completed. By reference to figures 137 and 138 a comprehensive idea of the various steps of the operation may be obtained.

After-Care—Keep the head haltered up for twenty-four hours to prevent the patient from lying down. The vaginal wound requires no treatment. The mare is simply placed in a sanitary box stall, where she is allowed to remain for ten to twelve days, after which she should be put back to hard, steady work until the habit is forgotten.

Sequelae—Colic and peritonitis.

CHAPTER II.

COW, HEIFER AND CALF SPAYING.

COW SPAYING.

Objects and Indications—Cows are spayed for two principal reasons: 1st, to correct that disagreeable condition known as nymphomania; 2nd, to increase the duration of the lactation period. Spaying is the only rational treatment for certain forms of nymphomania, and cows thus affected should either be submitted to the operation or sent to the butcher. While the op-

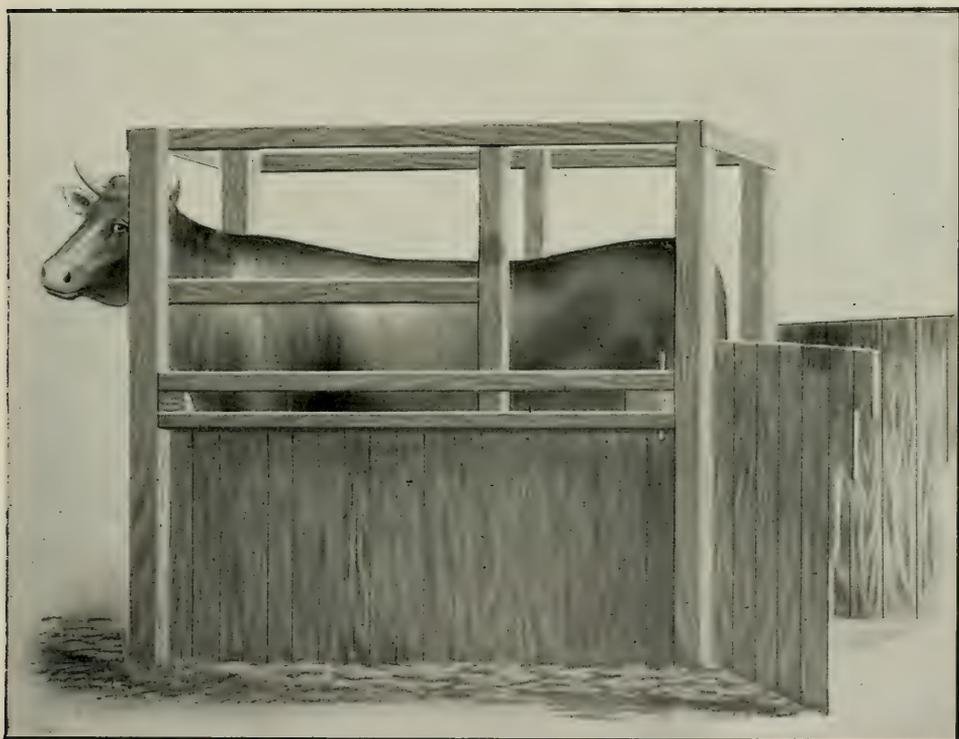


Fig. 139—Spaying chute and stocks.

eration has not been generally and extensively practiced as a means of controlling lactation, nevertheless spaying a milch cow during the height of lactation will not only cause her lactation period to continue for from two to three years, uninterrupted by estrum and pregnancy, but the quantity and quality of the milk is increased and improved. Milk from spayed

cows contains an increased amount of cream, casein and sugar. It is more palatable and more wholesome than milk from unspayed cows. When lactation finally ceases a spayed cow readily takes on fat and is easily put in shape for the butcher. The results attained wherever the operation has been practised justify its more general adoption.

Age—For treatment of nymphomania cows are spayed regardless of age. For increasing the duration of the lactation period it is best to operate after the udder has attained its full development and while at the height of lactation, i. e., when the second or third calf is about three to four weeks

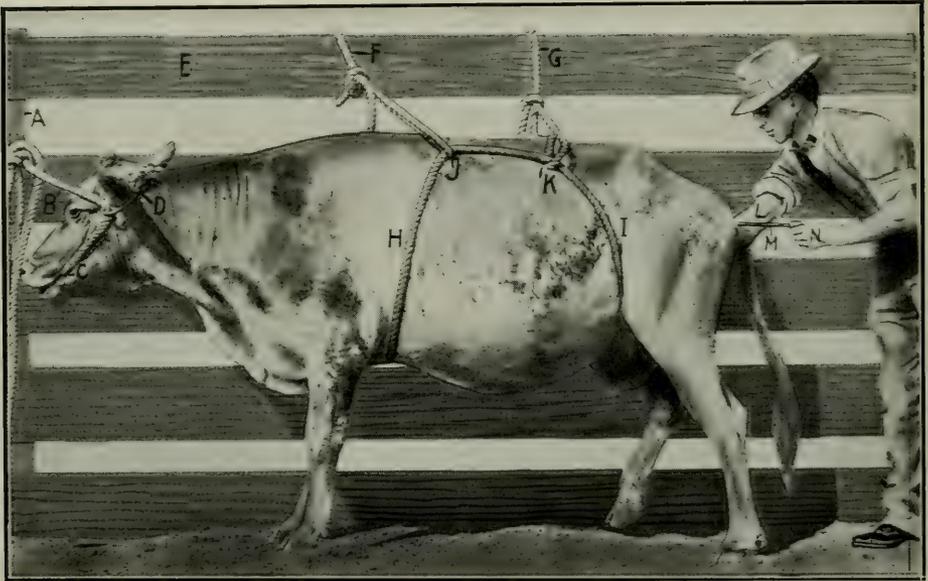


Fig. 140—Cow tied to a fence for the spaying operation.

old. Some cows are in their prime with the second calf, others not until the third calf. The udder never develops and the milk flow never increases after spaying, hence it behooves the operator not to make a mistake in selecting the time to operate. Never operate during the estral period.

Season—Since the vaginal operation is the method recommended, the season does not play an important part. The spaying may be done with safety at any season.

Preparation—The alimentary tract, especially the rectum, should be empty. Hence it is necessary to withhold feed for thirty hours previous to operating. Immediately before operating the rectum should be emptied either by “back raking” or by a copious enema.

Restraint—The operation should always be performed with the animal

in the standing posture. Stocks (Fig. 139) are preferable when available. However, when stocks are not at hand the animal may be quickly fastened to a wall or fence with ropes (Fig. 140.) The head is first fastened to the post, after which a 30-foot rope is looped around the body and fastened to a fence or wall as shown. In this position the animal can be readily spayed without her casting herself.

Position—Standing.

Instruments—1. Colin's Scalpel. (Fig. 128.)

2. Williams' ratchet spaying ecraseur (Fig. 129), or Dunn's spaying ecraseur (Fig. 130).

3. Williams' spaying speculum (Fig. 133), or Paseley's spaying speculum (Fig. 134).

4. Injection pump.

Anatomy—The anatomy of the internal and external generative organs

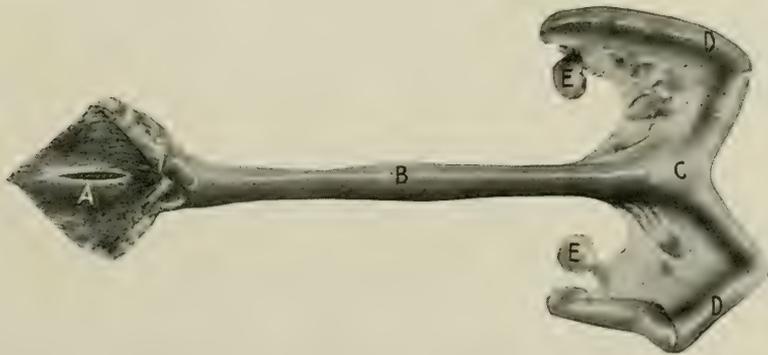


Fig. 141—Internal and external genitals of the cow. A, Vulva; B, vagina; C, uterus; D, D, horns; E, E, ovaries.

of the cow simulates that of the mare to some extent. However, in order that the comparison may be studied, we will take up briefly each organ separately.

Vulva—The vulva possesses two thickened labia and two sharp commissures, the lower of which is pointed and contains a number of long, stiff hairs.

The clitoris is small and located in the lower commissure of the vulva.

Vagina—The vagina of the cow is larger and longer than that of the mare. It varies in length from eight to fourteen inches. Its wall is thick. The meatus urinarius opens into its floor about five inches from the vulva.

Uterus—The uterus is short and lies almost entirely in the abdominal cavity. Its cornua are very long and gradually taper toward the fallopian tubes. The cervix is four and one-half to five and one-half inches long and its wall is thick and tough. Its lumen (cervical canal) is sharply curved

and small. The internal walls of the uterus and horns are studded with cotyledons, oval in shape and about eighty to ninety in number.

Fallopian Tubes—The fallopian tubes are longer in the cow than in the mare. Their junctions with the cornua are not so abrupt as in the mare.

Ovaries—The ovaries are very small in comparison to the size of the ani-

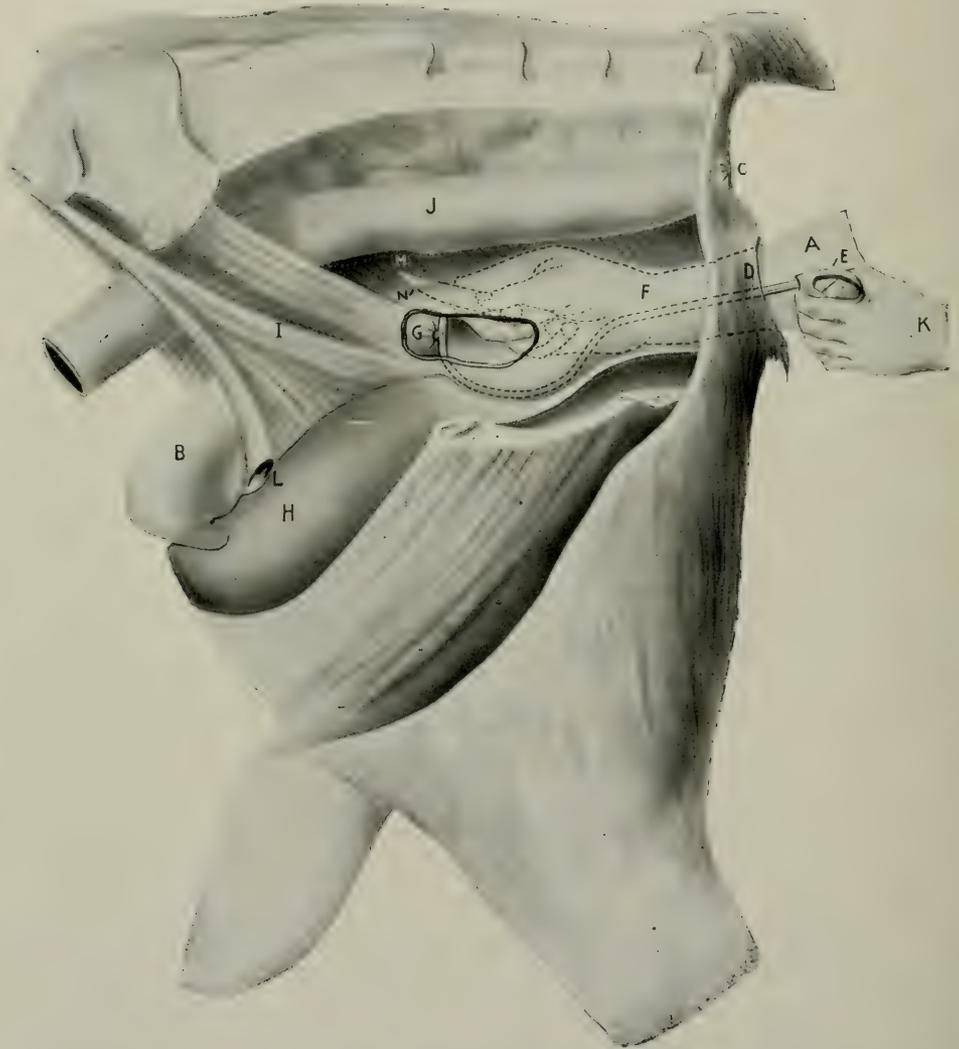


Fig. 142—Making the incision through the vaginal roof. A, Position of the right arm; B, uterus; C, anus; D, vulva; E, spaying speculum; F, vagina; G, cervix; H, urinary bladder; I, broad ligament; J, rectum; K, position of the left hand; L, ovary; M, point of knife outside the vagina; N, perforation in roof of vagina.

mal. They are oval in shape and situated usually a little above the middle of the lateral margin of the pelvic inlet. However, it is by no means uncommon to find them several inches from this location.

Warning—Unless the rectum is empty and the cervix forced downward and forward with the spaying speculum, the rectal wall is liable to be punctured with the point of the knife.

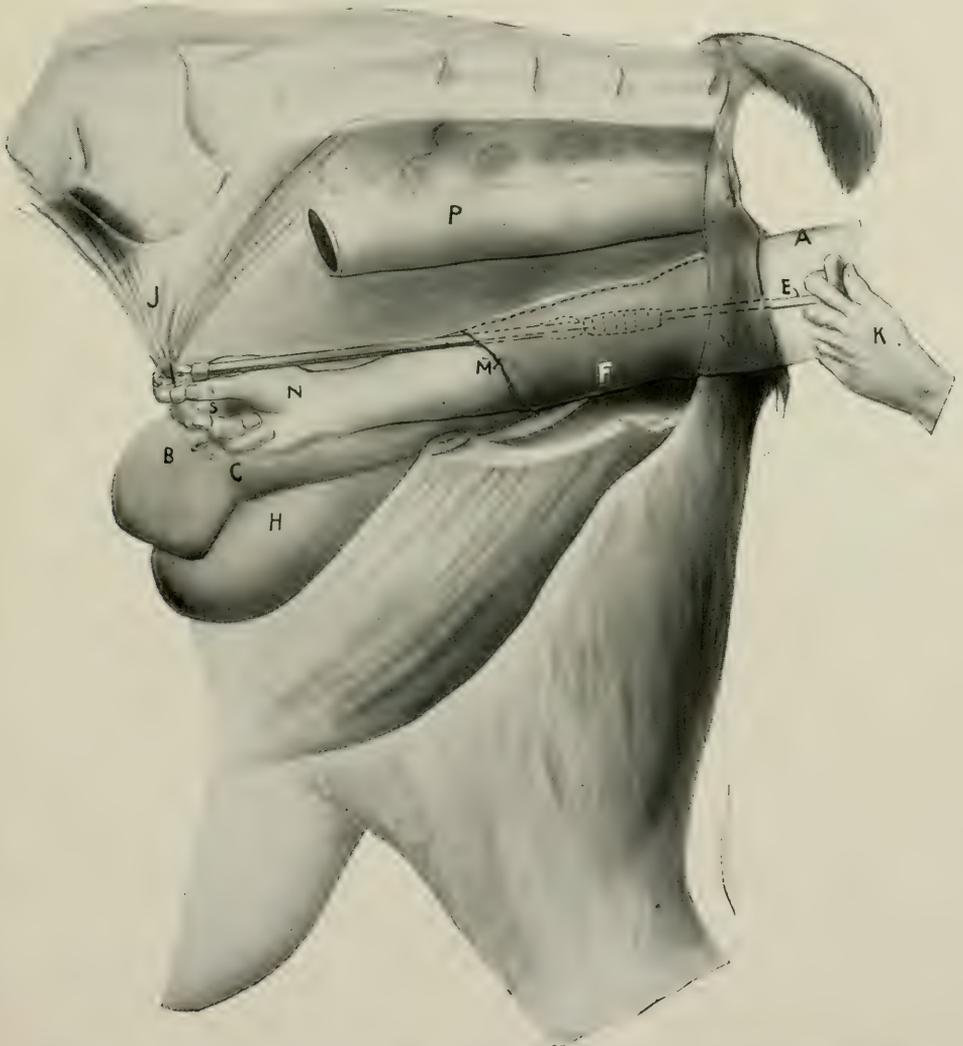


Fig. 143—Severing ovary from the broad ligament with the ecraseur. A, Position of the right arm; B, uterus; E, ecraseur; F, vagina; H, urinary bladder; J, broad ligament; K, position of the left hand; M, vaginal perforation; N, position of the right hand; P, rectum; S, ovary.

Sterilization of Instruments and Cleansing Operator's Hands—Every instrument used in connection with this operation should be sterilized by boiling fifteen to twenty minutes, and then placing them in Lysol or cresolis compound (U. S. P.), one tablespoonful to the quart of water. The operator's hands should be thoroughly washed with tincture of green soap, using a scrub brush, and then rinsed in the above solution. The operator should not be required to assist in handling the animal. This should be left to assistants.

Operative Technic—1. Douche the vagina thoroughly with the antiseptic solution, using an injection pump.

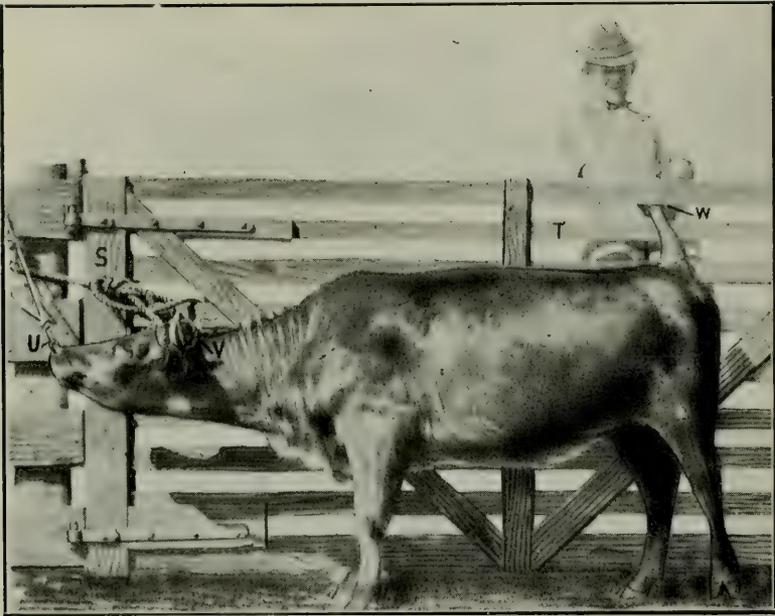


Fig. 144—Restraint of heifer for flank operation.

2. Wash the anus, vulva, and the upper third of the tail with the antiseptic solution, using cotton sponges.
3. Lubricate the right hand and arm with surgical jelly.
4. With the handle of the spaying speculum in the left hand, the right is passed into the vagina and the tip of the speculum placed in the cervix.
5. Withdraw the right hand, and with Colin's scalpel reenter the vagina and place the knife—with blade guarded—against the roof of the vagina immediately over the cervix. (Fig. 142.)
6. With the left hand raise the handle of the spaying speculum and

make downward and forward pressure sufficient to stretch the walls of the vagina taut.

7. Unguard the blade of the knife and thrust it through the vaginal roof, including the peritoneum, after which re-guard the blade and drop the knife on the floor of the vagina.

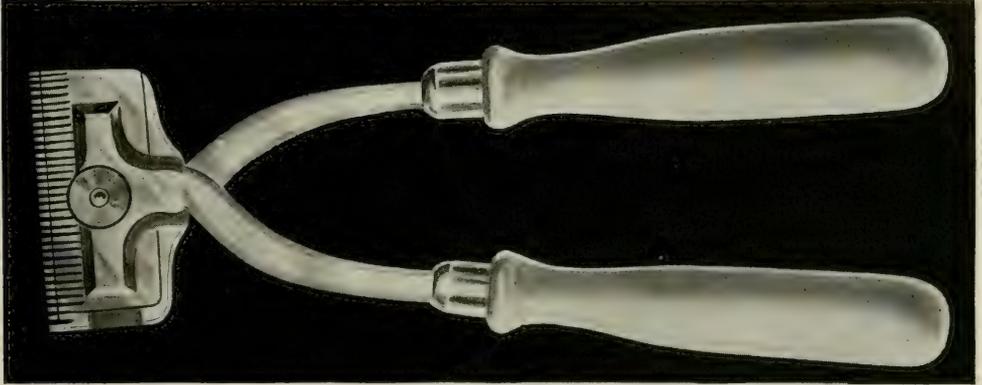


Fig. 145—Hair clipper.

8. With the index and second finger enlarge the perforation by stretching and tearing until the whole hand can be thrust into the abdominal cavity.

9. With the left hand pass the ecraseur into the vagina, where its chain

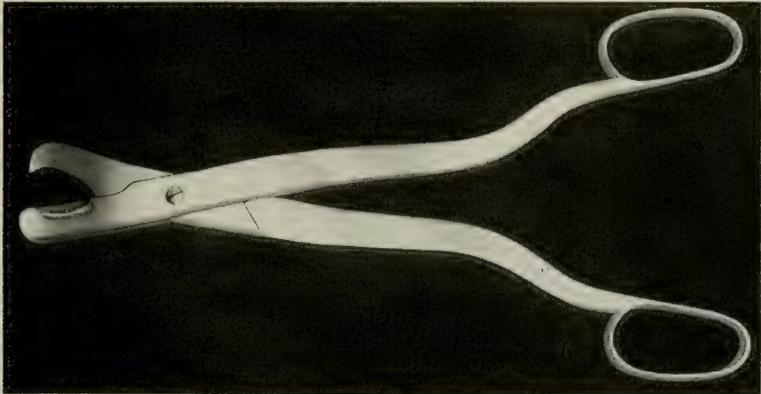


Fig. 146—Curved head spaying emasculator.

is grasped with the right hand and carried into the abdominal cavity. One of the ovaries is now located, the chain loop placed above it, and by ratchet movement of the handle the chain loop is closed and the ovary's attachment severed. The opposite one is removed in like manner, and both are

brought out when the hand, the ecraseur and the knife are withdrawn.

After-Care—Sanitary quarters and a limited diet for several days constitute the necessary after-care.

HEIFER SPAYING.

Objects and Indications—Heifers are spayed for the sole purpose of increasing their desirability as beef animals. Spaying appears to modify or alter the entire organism, especially as regards external symmetry and muscular development. It is followed by a decided tendency to quicker growth, and spayed heifers take on fat rapidly at any age. Such animals can be grown to maturity without the inconveniences of estrum and preg-

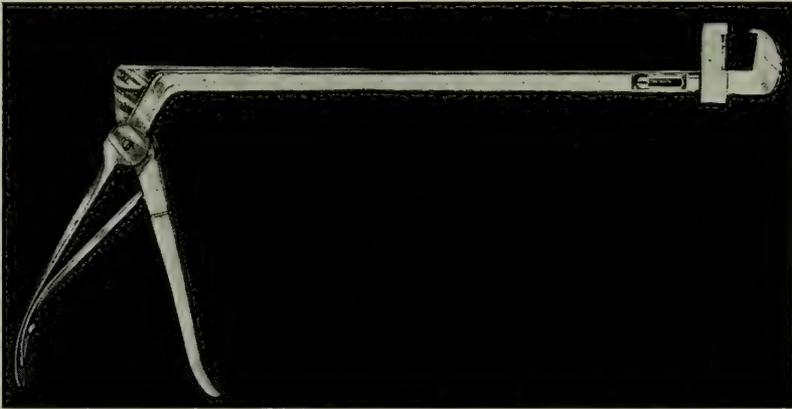


Fig. 147—Spaying emasculator.

nancy, and command the same price on the market as steers. They may be allowed to mingle with other animals in the herd—including bulls—with the assurance that pregnancy will not occur. The operation has been practiced extensively on the western range for many years with gratifying results. It should be encouraged and more widely practiced wherever beef cattle are grown. As an economic operation its value is hard to overestimate. It is indeed a simple and easy operation to perform, and is accompanied by a low mortality rate. Where once introduced its many merits commend its more general practice.

Age—The most preferable age is eight to twelve months, care being taken to operate before the heifer becomes pregnant.

Season—Spring and fall. Spaying should be done in the spring before flies appear, or in the fall after they disappear. It is not advisable to operate during fly time.

Preparation—Withhold feed for twenty-four hours previous to operat-

ing in order to have the alimentary tract comparatively empty. Water in limited quantities may be allowed.

Position—Standing.

Restraint—Spaying stocks (Fig. 139) are ideal means for restraint.

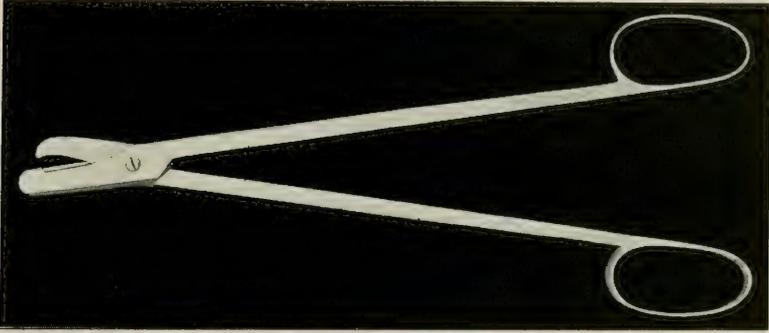


Fig. 148—Spaying emasculator.



Fig. 149—Jamison's spaying knife.



Fig. 150—Suturing fork.

When stocks are not available the quickest and at the same time one of the best methods of restraint is to tie the head to a gate post and have an assistant draw the tail between the slats of the gate above the animal. (Fig. 114.) The object in using a crack above the animal is to prevent its lying down. A good strong assistant—by traction on the tail—can hold the animal against the gate in such a manner as to limit movement from side to



Fig. 151—Miles' palm needle.



Fig. 152—Mooy's needle.

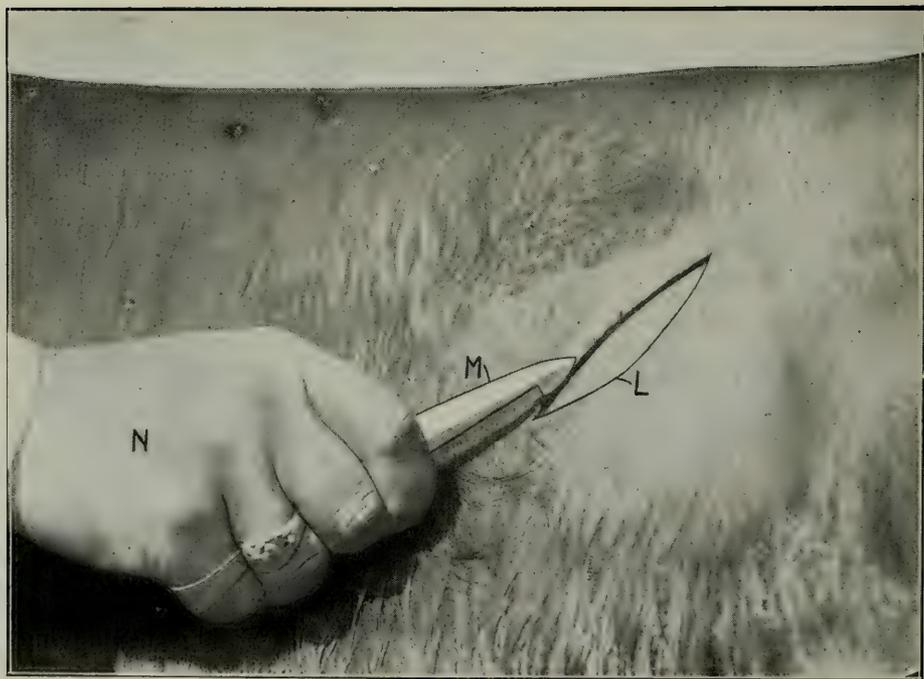


Fig. 153—Making skin incision. L, Incision; M, knife.

side and up and down. In this position the flank region is readily available for operation.

Instruments—1. Hair clippers. (Fig. 145.)

2. Curved head spaying emasculator. (Fig. 146). This is by far the most satisfactory instrument yet devised for flank spaying. It is easy to handle, takes up very little space in the incision and abdominal cavity, and controls hemorrhage perfectly. Two other spaying emasculators (Figs. 147 and 148) are fairly satisfactory. Figure 147 is an especially good one.

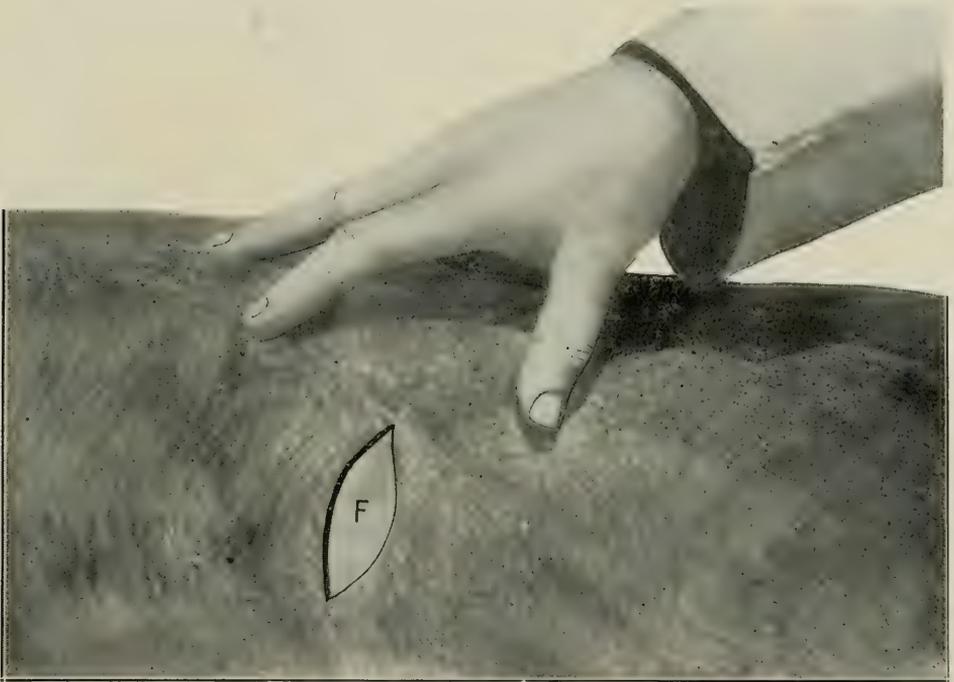


Fig. 154—Skin Incision. F, External oblique abdominal muscle.

3. “Farmers” Miles’ hooked castrating knife (Fig. 25), or Jamison’s spaying knife (Fig. 149.) The author prefers the Miles knife.

4. Suturing fork. (Fig. 150.) The fork is used to hold the edges of the skin wound while the needle is being thrust through. It is also provided with a knife for cutting suture material.

5. Suturing needle. There are two needles suitable for closing the wound: (a) Miles’ palm needle (Fig. 151), and Mooy’s ring handle needle (Fig. 152). The author prefers the Miles needle. However, in the West many spayers use the other style needle.

6. Curved scissors. (Fig. 35.)

7. Suture material. This may be either linen or silk. The author prefers No. 15 braided silk.

Anatomy—The anatomy of the internal and external genital organs of the heifer is the same as that of the cow. (See page 155.) The flank region possesses a well defined triangle, through the center of which the abdominal incision is made. The tissues penetrated by this incision are as follows: skin, subcutaneous connective tissue, fascia, external and internal oblique abdominal muscles and the peritoneum.

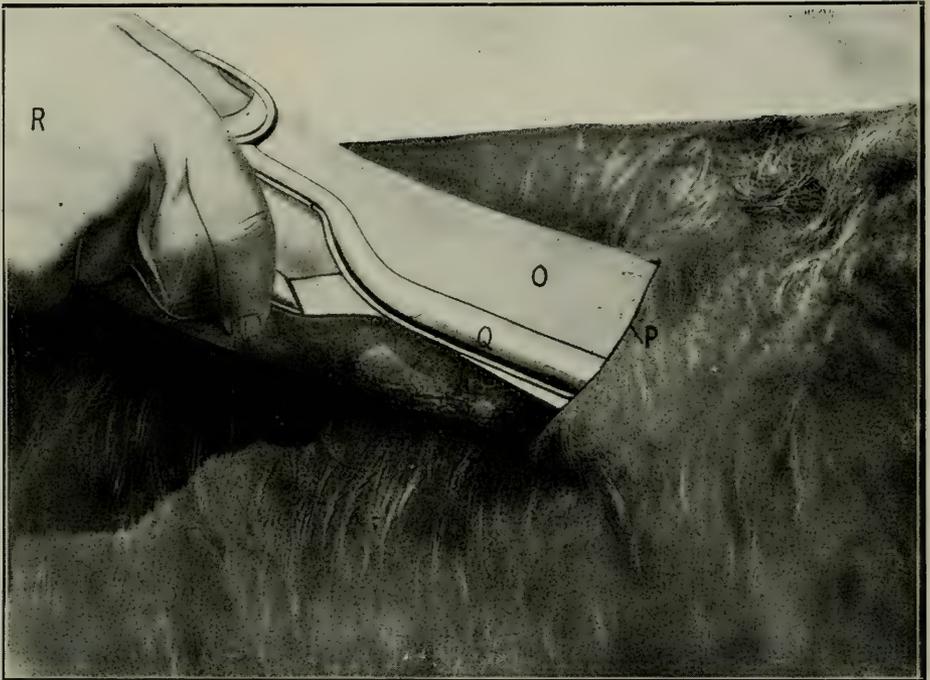


Fig. 155—Severing the ovary. O, Position of left arm; P, incision; Q, emasculator; R, position of right hand.

Sterilization of Instruments and Cleansing Hands of Operator—Same as for cow spaying. (See page 158.) If the operator is right-handed, it is best to invade the left flank. If left-handed, the right flank should be selected.

Operative Technic—1. Clip the hair from the site of operation.

2. Wash the parts with soap and warm water, using a scrub brush. Special care should be taken to remove all loose hair from the field, and sponge with antiseptic solution. As a further precaution against septic infection it is well to paint the skin with tincture of iodine.

3. Beginning 2 inches below the transverse process of the lumbar vertebrae, a slightly diagonal incision, three and one-half inches long, should be made through the skin *only*. The exact site of this incision is through the middle of the triangle between the external angle of the ilium and the posterior border of the last rib. (See L, Figs. 153 and F, 154.)

4. In the center of this skin incision the knife point should be thrust through the abdominal wall, making a perforation large enough to admit

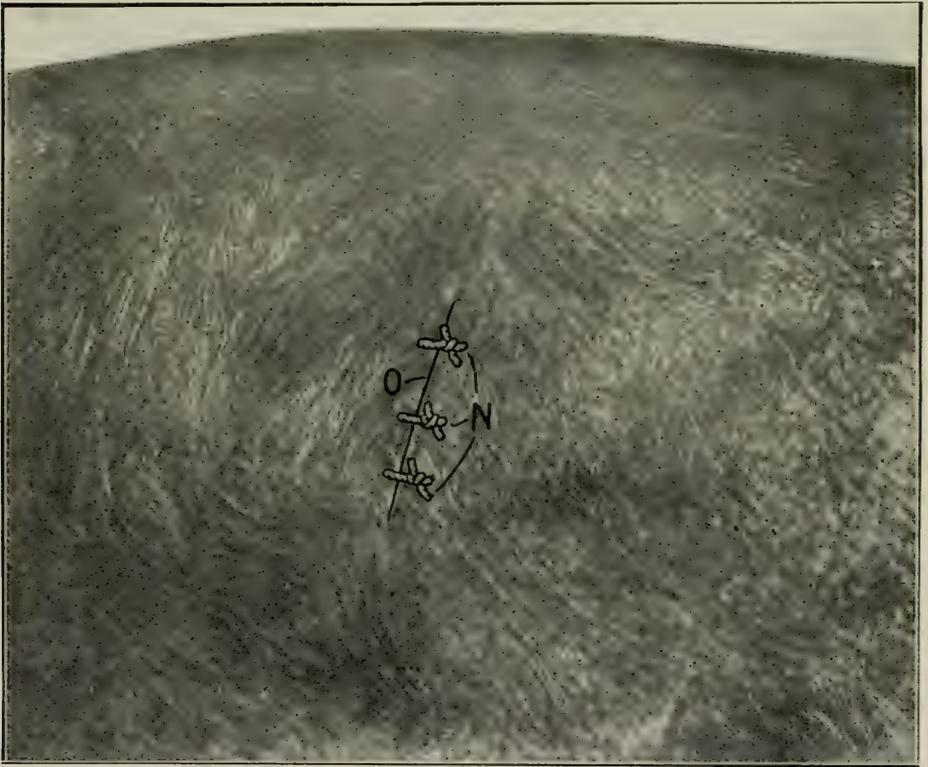


Fig. 156—The skin incision closed by three interrupted sutures; N, heavy silk or linen sutures; O, lips of the incision accurately approximated.

one finger only. The knife is now put aside, as there is no further use for it.

5. One finger of the operating hand is thrust through the perforation in the abdominal wall, and by stretching the wound, two fingers are admitted—index fingers of each hand. With these two fingers the muscular fibers are torn apart sufficiently to admit the whole hand.

6. With the left hand inside the abdominal cavity the body of the

uterus is located, after which follow its right cornu upward and backward until the right ovary is encountered.

7. With the right hand the emasculator is passed along the left arm through the incision, and its head placed above the ovary; bringing the handles together the ovary is severed from its attachment. (Fig. 155.)

8. The left ovary is now located by following the right cornu back to

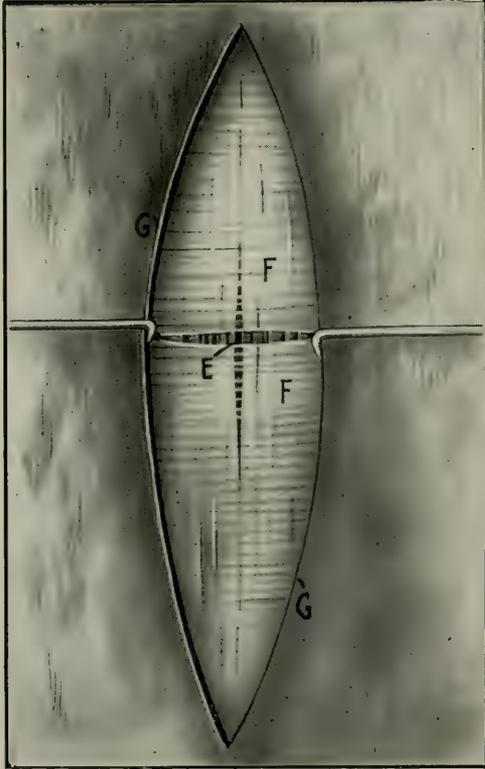


Fig. 157—E, Muscular fibers of internal oblique and external oblique muscles slightly divided; F, F, external oblique abdominal muscle; G, G, lips of skin incision.

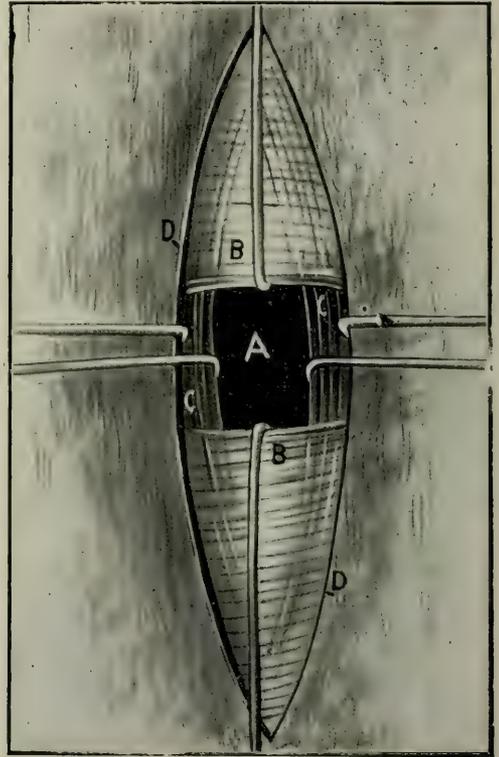


Fig. 158—A, Opening in abdominal wall sufficiently large to admit the hand; B, B, external oblique muscle fibers drawn apart; C, C, internal oblique muscle fibers drawn apart; D, D, lips of skin incision drawn apart.

the body of the uterus where the left cornu is encountered. By following it upward and backward the left ovary is encountered and removed in like manner.

9. Withdraw the hand—containing both ovaries—with the instrument. When this is done the fibers of the internal and external oblique abdominal muscles come together and anatomically close the wound with the exception of the skin incision.

10. With three interrupted sutures the skin incision is closed and the operation is completed. (Fig. 156).

Incision Illustrated and Explained—The exact method of invading the abdominal cavity through the flank incision is of special importance if successful spaying is to be done. Undoubtedly the incision is the most important step of the whole operation. It is made and closed as follows:

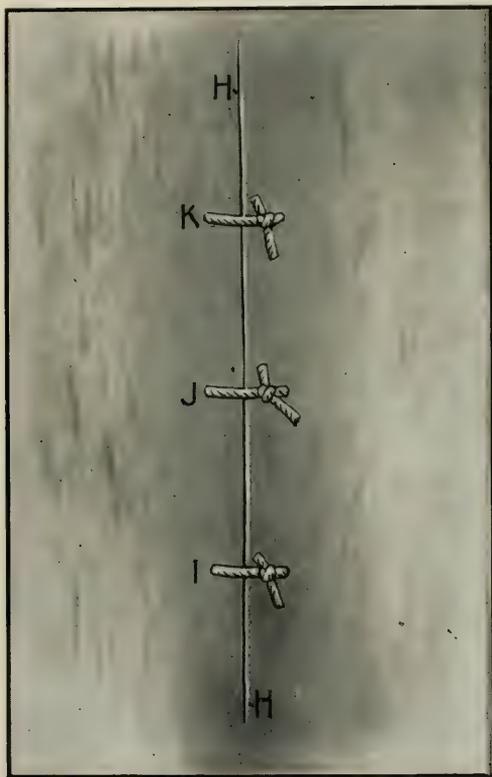


Fig. 159—Skin incision closed by three interrupted sutures. H, H, Lips of skin incisions; I, J, K, silk sutures.

(See Figs. 157, 158 and 159. Study these illustrations carefully.) With the knife in the right hand the skin incision G, G, (Fig. 157) is made. The point of the knife is thrust through the remaining portion of the abdominal wall (external oblique and internal oblique abdominal muscles and peritoneum). With the fingers this perforation (A, Fig. 158) is enlarged by tearing the fibers of the external oblique apart, B, B, and at the same time those of the internal oblique, C, C, are separated in the opposite direction until the hand can be admitted. When the hand is withdrawn the mus-

cular fibers automatically come together (Fig. 157) and practically close the wound with the exception of the skin incision, which is closed with three interrupted sutures, and the operation is completed (Fig. 159).

This method of making the flank incision far excels in every respect the one which requires cutting through the abdominal muscles. When these

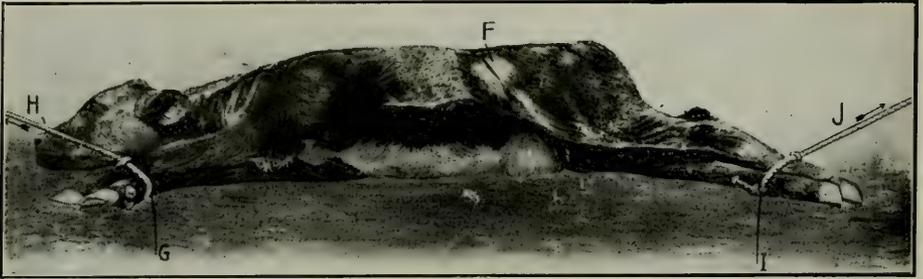


Fig. 160—Calf cast and tied for spaying operation (flank method).

muscle fibers are cut it makes a large gaping wound which requires weeks and oftentimes months to heal. With the fibers divided by tearing, the skin alone is sutured and the whole wound heals rapidly.

After-Care—Place the animals at pasture or in sanitary quarters. The

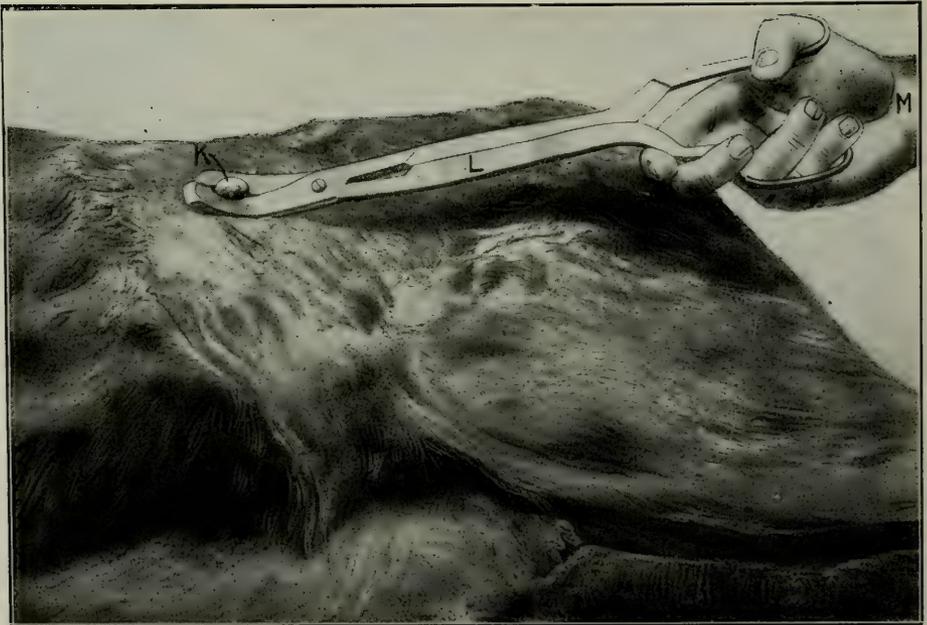


Fig. 161—Removing ovary from calf (flank method). K, Ovary; L, emasculator.

wounds should be observed from day to day for stitch abscesses, etc. Should abscesses develop, the suture should be removed and the pus allowed to escape. The sutures should be removed, when possible, about the eighth day. Oftentimes the sutures are not removed, in which event they finally slough out.

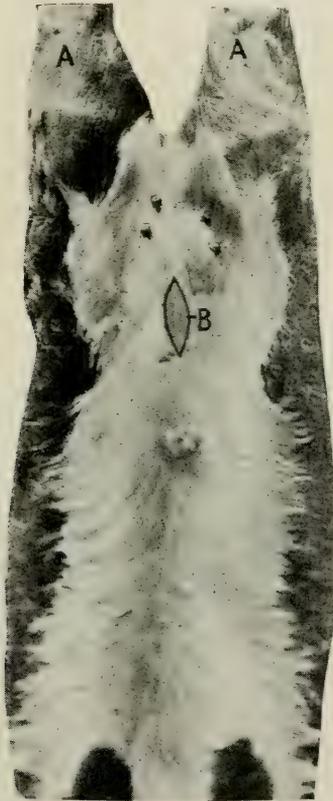


Fig. 162—Incision (belly method).

CALF SPAYING

Objects and Indications—Calves are spayed for the same purposes that heifers are spayed, viz.: the operation hastens their growth and development, besides improving the texture and nutritive properties of the meat. Spayed calves may be raised to full maturity without the annoyance of either estrum or pregnancy. Another reason for calf spaying is that the mortality rate is less in young than in older animals. There are two approved methods of spaying calves, viz.: the belly method and the flank method.

Age—The favorite age for calf spaying is two to four months.

Season—Spring and fall.

Preparation—Same as for heifer spaying.

Position—Lateral, recumbent or hanging, depending upon whether the belly or the flank is to be invaded.

Restraint—For the flank operation the calf is simply stretched full length

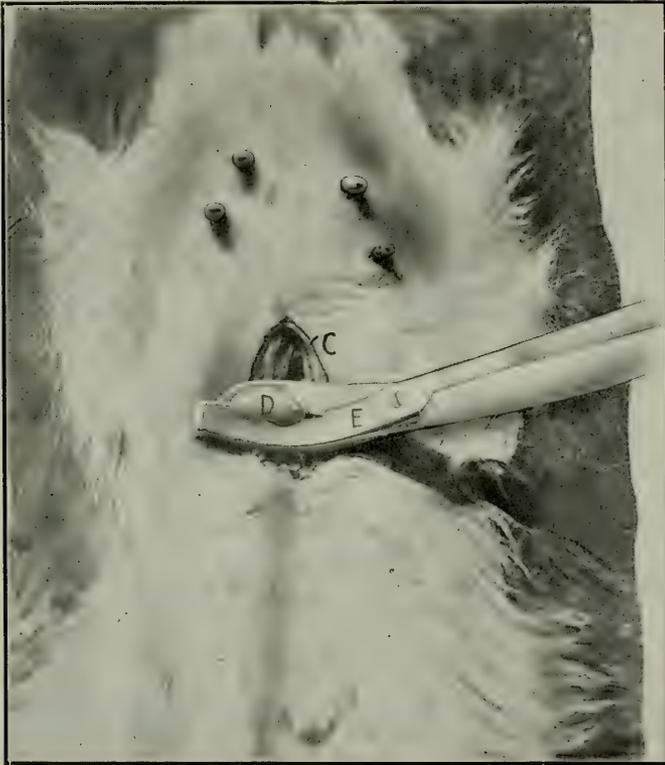


Fig. 163—Removing ovary (belly method). C, Incision; D, ovary; E, emasculator.

on the ground by a rope looped above the hind and fore fetlocks. (Fig. 160.) For the belly operation the animal is suspended by a cord or a small rope looped over both the hocks and attached to a beam or hook above. The height at which the animal is suspended should be such that the incision is about opposite the breast of the operator.

Instruments—Same as for heifer spaying. (See page 155.)

Sterilization of Instruments and Cleansing Operator's Hands—Same as for heifer spaying. (See page 158.)

Operative Technic—(Flank method.) The hair is clipped from the site

of incision. The parts are washed with soap and warm water, and then sponged with an antiseptic solution. As a further precaution against septic infection it is well to paint the skin with tincture of iodin. The incision is made similar to that employed in heifer spaying (pages 158, 159), with the exception that in the calf a much smaller one is used since only the index and second finger are introduced into the abdominal cavity; whereas in



Fig. 164—Incision closed by interrupted sutures.

heifer spaying the whole hand is inserted. With the two fingers inside the abdominal cavity a search is made for the uppermost uterine horn, fallopian tube or ovary. One or the other of these is usually found with little difficulty by wiping downward and backward toward the pubic brim. When located the ovary is brought up into the incision and its attachments severed with the emasculator. The opposite ovary is located and removed in like manner. (Fig. 161.) The skin incision is closed by two interrupted sutures.

Operative Technique (Belly method)—With the calf suspended by the hind

legs, the hair is clipped from the site of incision and the parts thoroughly washed and disinfected the same as for spaying by the flank method. Begin the incision in the median line two inches below the brim of the pubis, and extend it downward for three inches, penetrating all the layers of the abdominal wall. (Fig. 162.) With the index and second finger inside the abdomen the ovaries are readily located and brought into the incision and their attachments severed with the emasculator. (Fig. 163.) The incision is closed by three or four through-and-through sutures. (Fig. 164.)

After-Care—Same as for heifers. (See page 160.)

Sequelae of Cattle Spaying—Hemorrhage, septic peritonitis, abscess, general sepsis, hernia and bloating are the most common sequelae.

CHAPTER III.

SPAYING SOWS

Objects and Indications—The paramount purpose of this operation is to improve growth, fattening, marketing and slaughter qualities without the handicap of early pregnancy. The economic importance of sow spaying is recognized by many swine owners. Formerly the operation was more generally practised than at the present day. This may be accounted for by the fact that what would have formerly been termed revolutionary methods in raising and marketing hogs are now in vogue in the great swine-raising sections of the Middle West and Central States. This practice enables swine owners to grow, fatten and market hogs as early as six to ten months of age, and is becoming more universal each year. Of course under such circumstances spaying is not an essential operation. However, in the South and Southwest the older methods of swine-raising still prevail to a limited degree, hence in this section the operation of spaying is still practised to a limited extent.

Age—The operation is best performed at four months of age. However, it is permissible any time from sixty days old to maturity, or even old age.

Season—Sows should not be spayed during fly time nor in extremely cold weather. It is best to operate in the fall, early winter and spring.

Preparation—One of the most important essentials to success in spaying sows is to have the alimentary tract absolutely empty before undertaking to operate. This is best accomplished by withholding feed for from twenty-four to thirty hours previous to operating. During this time there is no special objection to allowing the animal free access to water. The danger of septic infection can be greatly minimized by providing clean quarters before and after operation. Another essential is not to allow the boar access to the sows previous to spaying. It is best not to operate during the estral period. Pregnancy is a contra-indication to successful spaying.

Restraint—Proper restraint technic is as essential in spaying sows as in almost any other operation in animal surgery. This operation calls for the simple and easily applied, rather than the intricate methods often employed in other operations. The method of restraint used must of course depend upon whether the flank or the belly operation is to be performed. If the abdominal cavity is to be invaded from below (belly method) the most simple and satisfactory restraint consists in looping a strong cord (window

sash cord) or a small rope above the hocks, by which the animal can be readily suspended to a post or wall in the hanging posture (Fig. 165.)

If the flank incision is to be used, it is necessary for the animal to be confined in the recumbent posture at an angle of about thirty degrees on either the right or the left side, depending upon which flank is to be invaded. One of the best and most satisfactory methods the author has ever employed is as follows: Procure a piece of three-eighths inch soft



Fig. 165—Restraint for spaying the sow (belly method).

rope about six feet long. Tie the ends together, forming a loop as shown in Fig. 166. Next secure a 2x14 inch plank about twelve feet long; place one end on the floor or ground and either spike the other end fast to a wall or suspend it by means of a rope from above. Make the rope loop fast to the upper end of the plank with a screw eye or a spike (A), or it may be fastened by boring a hole through the plank large enough to permit the rope to be drawn up through it where it is held secure by large knots in its ends. The contrivance should be so arranged that when the hog is

fastened on the plank it will be about waist high to the operator as shown in the illustrations. The plank should be on a slant of about thirty degrees. The operator standing facing the board, with his right hand toward the lower end, passes his right hand (D) Fig. 166 through the loop (C) and instructs his assistant to grasp the right legs of the hog and bring the hog to him, placing it on the board. As the assistant approaches with the hog, pass your left hand under the right hand and rope, grasping the left hind leg (E), while your right hand grasps the right hind leg (Fig. 167). Now



Fig. 166—Restraint for spaying the sow (flank method), first step. A, Board with end elevated; B, rope suspending the board; C, rope loop snaring the hind feet; D, E, position of hands.

guide the left leg to your right hand, and grasp it. The left hand now contains both hind feet, while the right hand grasps the loop from over the left wrist and carries it back, dropping it above the fetlocks. As you drop the rope back of the leg, instruct your assistant to pull the hog downward on the board, making the rope taut as shown in Fig. 168. With a

little practice a sow may be secured by this method in less than five seconds.

Instruments—1. Curved scissors (Fig. 35) for clipping hair from the site of incision.

2. Miles' hooked knife (Fig. 25).

3. Swine and sheep emaseculator (Fig. 80).

4. Hagedorn's needle (half circle) No. 3 (Fig. 84).

5. Richter's needle-holder (Fig. 34).

6. Braided silk No. 12 or linen for sutures.

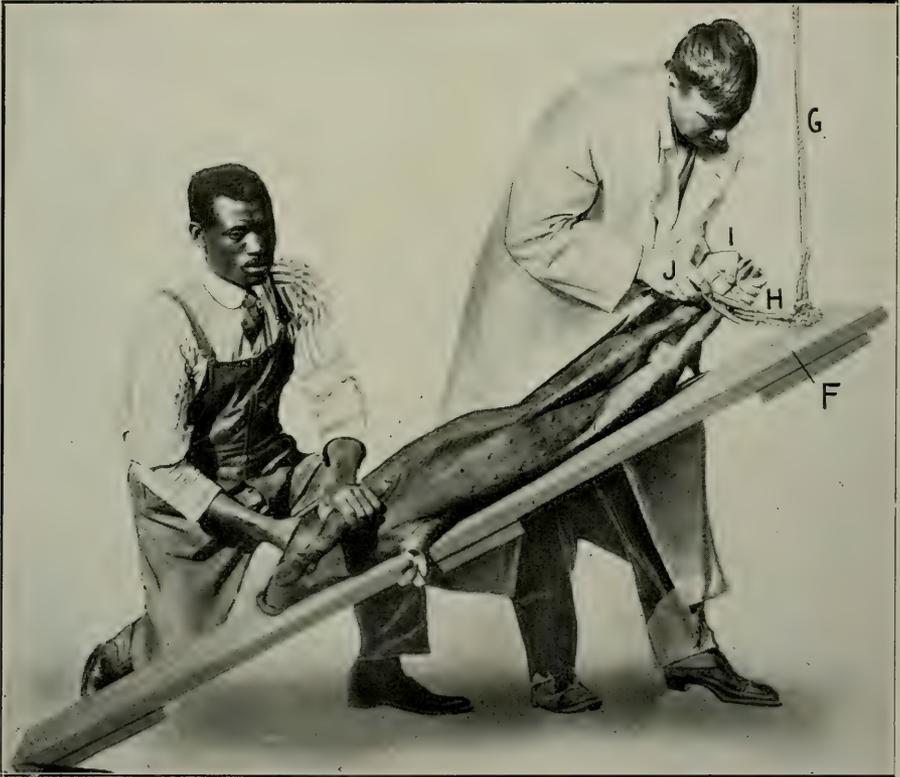


Fig. 167—Restraint for spaying operation on sow (flank method), second step.
F, Board; G, rope suspending board; H, rope loop.

Anatomy—It is well to remember that the fallopian tubes and horns of the uterus in sows are extremely long in comparison to their length in other animals, and that their course is decidedly tortuous in the pelvic and abdominal cavities. The importance of this can be more thoroughly comprehended and appreciated by carefully observing these parts and their relation, which is plainly illustrated—in a diagrammatic way—in Fig. 169.

The body of the uterus is unusually short when the length of its tubes are taken into consideration. The cervix does not project into the vagina as in most other domestic and wild animals. On the other hand, the vagina and uterus of the sow unite without any circumscribed limit intervening between them. The horns float loosely in the abdominal cavity and are found closely associated with the convolutions of the intestines. The broad ligaments are mesenteric in conformation and character and are extremely thin and lax. The ovaries are decidedly lobulated and closely resemble grape

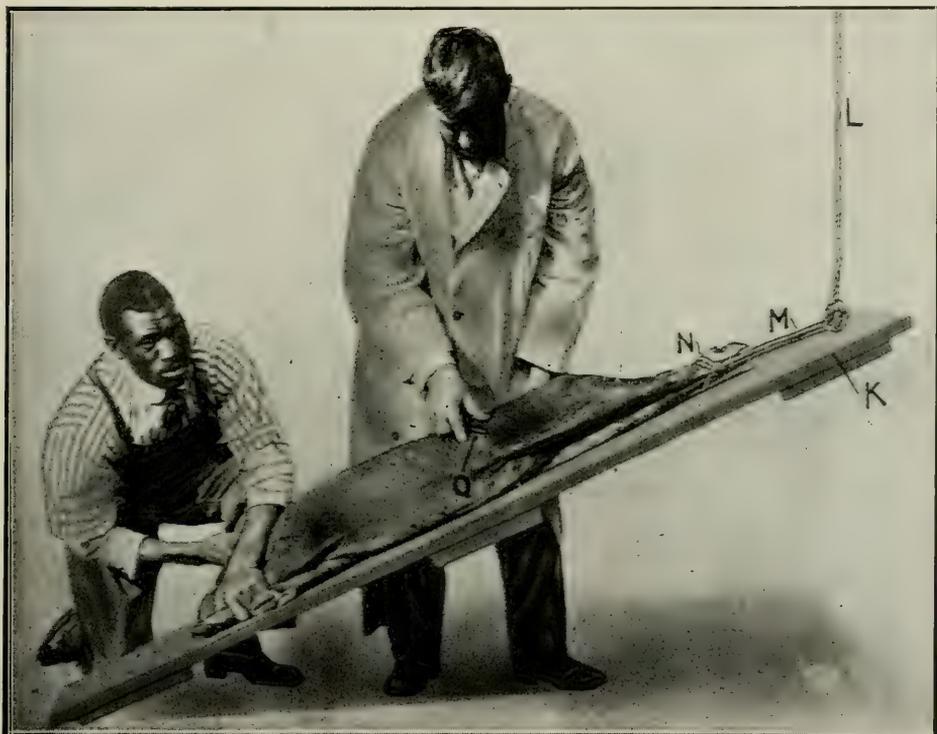


Fig. 168—Restraint (of sow) for spaying operation (flank method), third step. N, Hind legs fixed; O, flank incision.

clusters suspended to the right and left of the vertebral column near the median line of the body. Fig. 170 illustrates the external as well as the internal generative organs of the sow.

The abdominal wall in the flank region is quite thick and contains much fat between the skin and the external oblique abdominal muscle. More fat is encountered in mature sows than in younger hogs. The skin is dense and tough, while the external and internal oblique muscles and peritoneum are comparatively thin and delicate in structure. The above description

applies equally well to the belly wall at the site of the incision for the spaying operation, except that the wall in the latter region is somewhat thinner.

Methods of Operating—There are two standard methods, viz.: flank, and

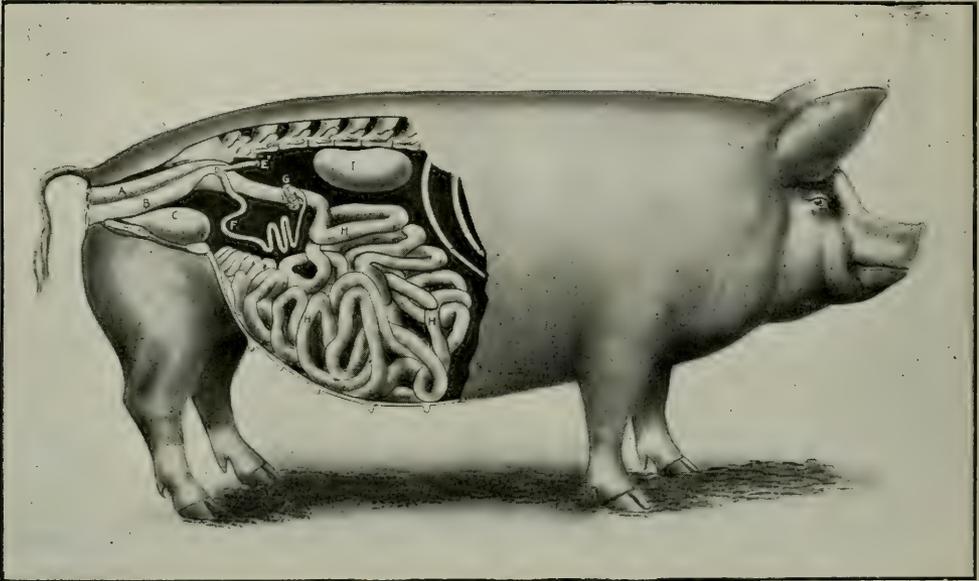


Fig. 169—Internal genital organs of sow (diagrammatic). A, Rectum; B, vagina; C, bladder; D, uterus; E, left uterine horn; F, right fallopian tube and horn; G, ovary; H, intestines; I, kidney.

the median line or belly method. Each has its advantages and disadvantages, however, taking everything into consideration the author much prefers the flank method.



Fig. 170—External and internal generative organs of the sow. A, Ovaries; B, uterine horns and fallopian tubes; C, uterus; D, vagina; E, vulva.

Operative Technic (Flank method)—The animal should be properly secured as illustrated in Figs. 166, 167 and 168, and placed on the right

side. Remove the hair from the flank by clipping with scissors. The hands of the operator and the left flank of the animal should be washed with Lysol or Cresolis compound (U. S. P.), one tablespoonful to each quart of



Fig. 171—Excision of the ovaries of the sow, flank method. P, Ovaries; Q, fallopian tubes and horns; R, emasculator.



Fig. 172—Abdominal incision, closed with two interrupted sutures.

water. With a hooked knife make an oblique incision an inch to an inch and a half long, beginning high in the flank, one to two inches posterior to the last rib. This incision should run downward and backward at an angle of 45 degrees (see O, Fig. 168). The incision should penetrate the skin, subcutaneous connective tissue, fat and external and internal oblique abdominal muscles. By this we mean all tissues down to the peritoneum—the lining of the abdominal cavity. The peritoneum is then carefully punctured with the point of the knife, after which stretch or tear the



Fig. 173—Belly incision.

incision sufficiently to admit the index finger of the left hand. With this finger inside of the abdomen the left (upper) ovary is located by passing the finger backward near the fundus of the bladder and upward toward the vertebral column. The ovary can be readily distinguished from the other intra-abdominal viscera by its peculiar feel, as it consists of hard lobules arranged in cluster form resembling small grapes. The left ovary and its accompanying fallopian tube are drawn through the incision. In

young sows the left tube is now withdrawn from the abdominal cavity and followed back to the bifurcation where the right tube is encountered. The right tube is withdrawn from the abdominal cavity and followed until the right ovary is located, after which the ovary is drawn out of the abdomen through the incision and both ovaries (P) placed in the emasculator and

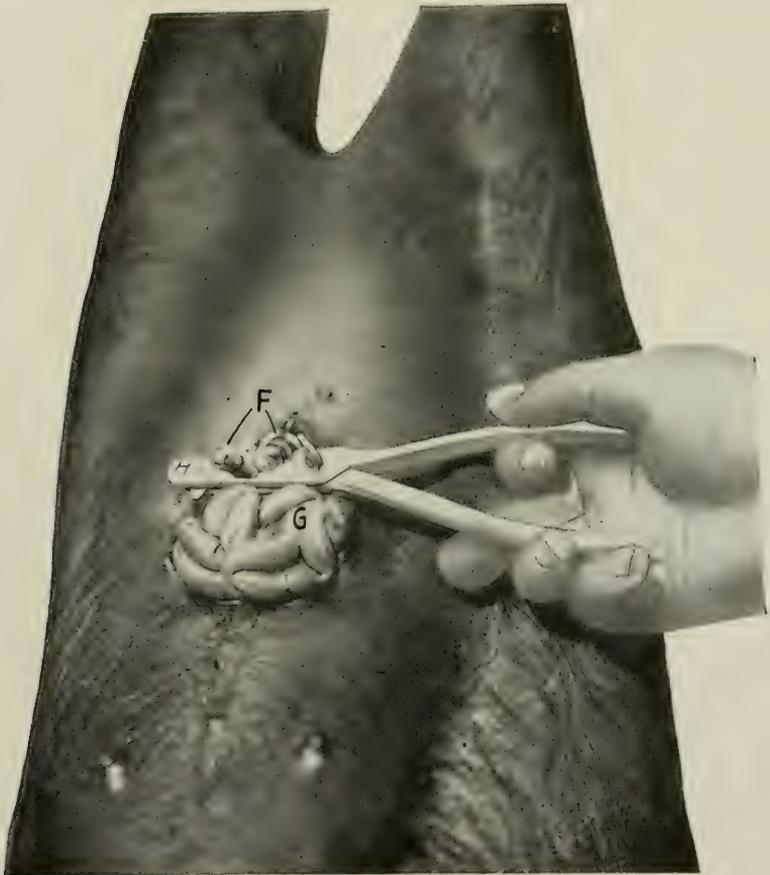


Fig. 174—Excision of the ovaries, belly method, sow. F, Ovaries; G, fallopian tubes and horns; H, emasculator.

their attachments severed by closing the handles of the instrument. The tubes (Q) are now washed and replaced in the abdominal cavity (Fig. 171), and the incision closed by two interrupted sutures. These sutures should be made with a No. 3 half-circle Hagedorn needle and No. 12 braided silk. The sutures should extend through all layers of the abdominal wall, including the skin and peritoneum, or in other words, should be what are known

as through-and-through sutures. (Fig. 172.) Sponge off the wound with antiseptic solution and release the animal.

In sows which have given birth to one or more litters of pigs, the fallopian tubes are oftentimes so large that the left one must be replaced in the abdomen before the right one can be withdrawn. In such event, of



Fig. 175—Wound closed (belly method).

course, only one ovary can be removed at a time. However, both ovaries can always be removed through the same flank incision.

Operative Technique (Median line or belly method)—Sterilize the instruments and wash the hands the same as for the flank operation. With the animal properly secured in the hanging posture (Fig. 173) the hair is removed from the site of the incision and the parts cleansed. With the

hooked knife begin the incision two to three inches below the brim of the pubis and one-half inch either to the right or left of the median line. This incision should be extended downward about one and one-half to two inches,

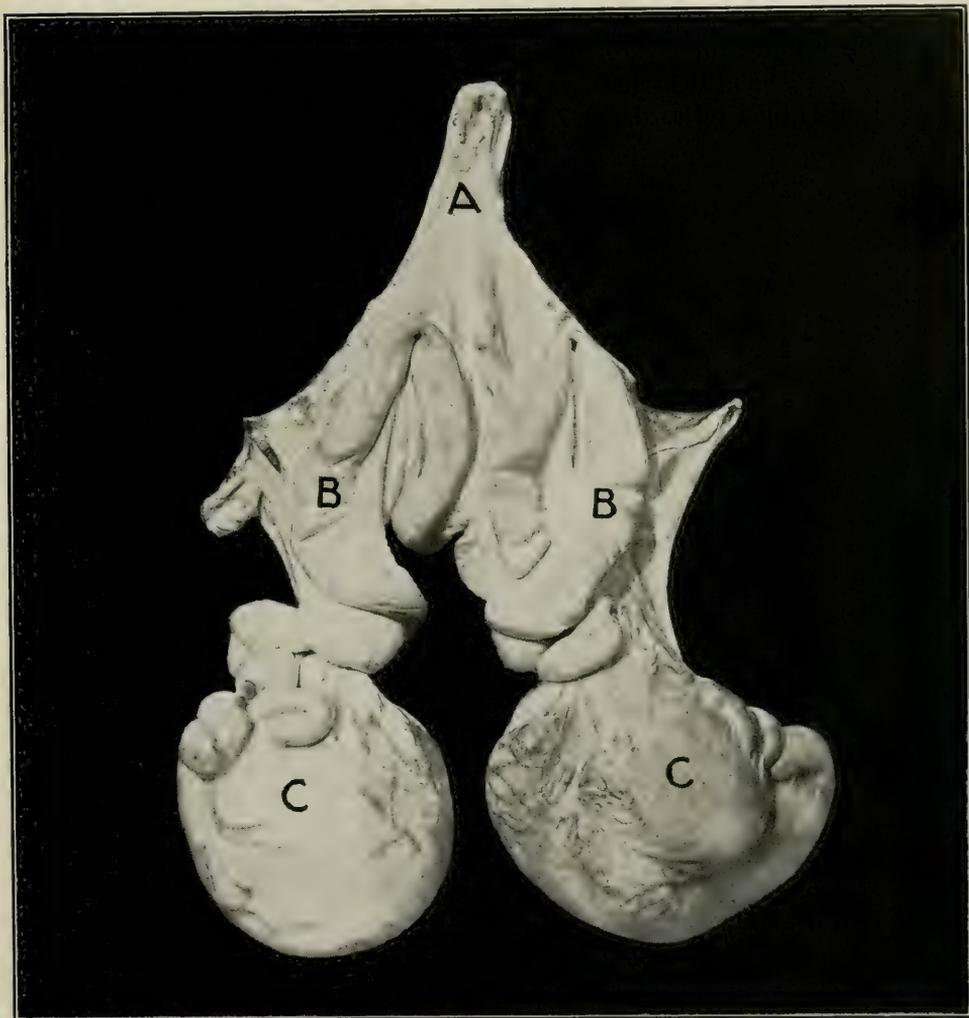


Fig. 176—Cystic ovaries that weighed 4 pounds, removed from a sow weighing 170 pounds. A, Uterus; B-B, horns; C-C, ovaries.

and should include all layers of the abdominal wall, down to the peritoneum.

The peritoneum is now punctured with the point of the hooked knife, after which the incision is enlarged sufficiently to admit the index finger

of the left hand. With this finger the ovaries and tubes are readily located near the median line of the body, and are drawn through the incision (Fig. 174) and removed with the emasculator as in the flank method.

The tubes and horns are sponged with antiseptic solution, after which they are replaced in the abdominal cavity and the wound closed by two or three interrupted through-and-through sutures (J, Fig. 175), using the same needle and the same size silk as in the flank method of operating. The animal is then released.

CHAPTER IV.

EWES SPAYING

Objects and Indications—Sheep spaying is rarely ever practiced in this country because of the fact that the ewe is more valuable as a breeding animal than for mutton purposes. Spayed ewes mature earlier, grow larger and take on fat faster than unspayed ewes. On this account they are sometimes spayed for fat stock show and exhibition purposes.

Age—Two and one-half to three months is the age of choice.

Season—Late winter and early spring.

Preparation—Empty alimentary tract by withholding feed for twenty-four to thirty hours previous to operating.

Position—Hanging.

Restraint—The ewe is exceedingly docile and submits readily to opera-



Fig. 177—External and internal genital organs of the ewe. G, vulva; H, vagina; I, uterus; J-J, horns; K-K, ovaries; L-L, broad ligament.

tion. With a small rope or a large cord looped above each hock the animal is suspended from a hook or beam. The field of operation should be on a level with the breast of the operator.

Instruments—1. Curved scissors (Fig. 35) for clipping wool from the site of incision. 2. Miles' hooked knife (Fig. 25). 3. Swine and sheep emasculator (Fig. 80). 4. Hagedorn's needle, half circle, No. 3 (Fig. 84). 5. Richter's needle-holder (Fig. 34). 6. Braided silk No. 12 for suturing.

Anatomy—The conformation and anatomical relation of the internal generative organs of the ewe are almost identical with those of the cow except on a much smaller scale. The abdominal wall at the site of incision is very thin and exceedingly delicate.

Warning—On account of the thin and delicate structure of the abdominal wall, exceeding care must be exercised in suturing the incision.

Sterilization of Instruments and Cleansing Hands of Operator—Same as for calf spaying.

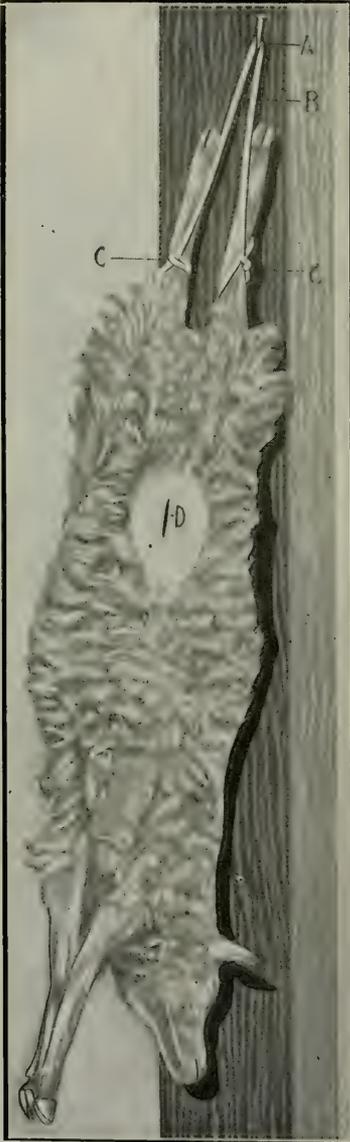


Fig. 178—Abdominal incision.

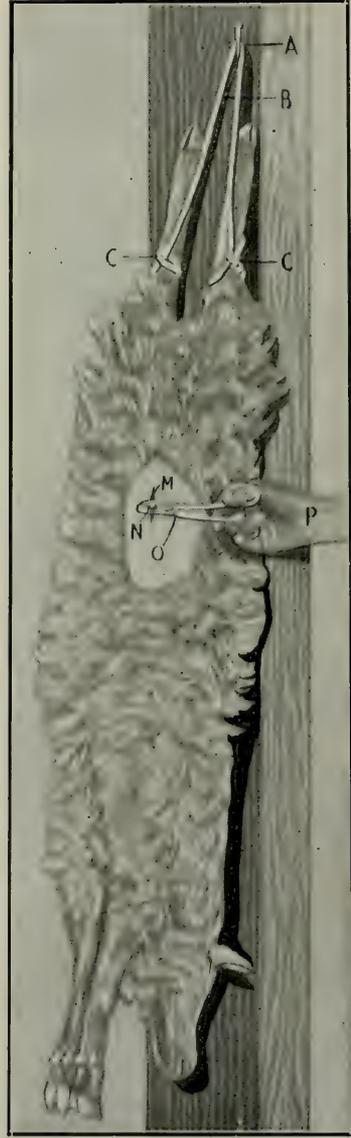


Fig. 179—Removing ovary.
M, Incision; N, ovary; O, emasculator.

Operative Technic—With the ewe in the hanging position, the wool is clipped from the field of operation, after which the parts are cleansed with soap and water and disinfected by painting with tincture of iodin. 1. Begin the incision in the median line three inches below the brim of the pubis,

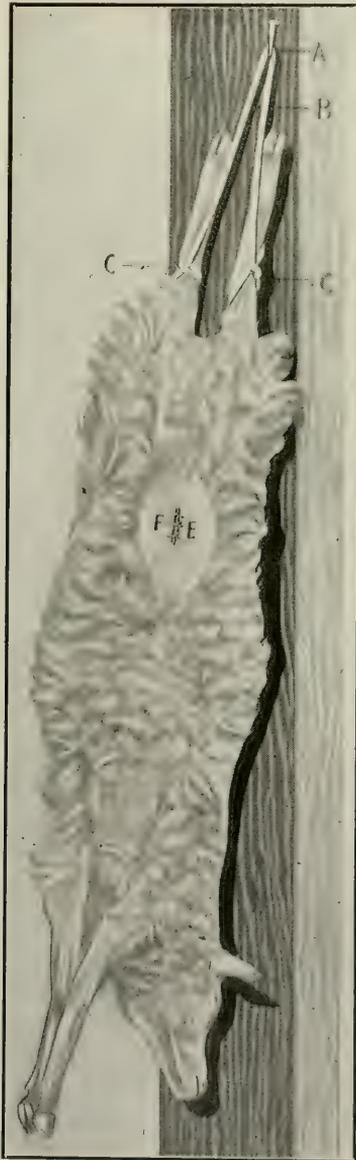


Fig. 180—Wound sutured.

and extend it downward for a distance of two and one-half or three inches. (Fig. 178.) This incision should penetrate all layers of the abdominal wall. 2. With the index and second finger inside the abdomen the horns and ovaries are readily located, after which each ovary is withdrawn and severed from its attachments. (Fig. 179.) 3. The abdominal incision is now closed by three interrupted through-and-through sutures, care being taken to see that each layer of the abdominal wall is in direct apposition.

After-Care—The spayed animals should be turned to pasture if weather conditions are favorable, otherwise sanitary well bedded quarters are to be provided. If the sutures do not slough out they should be removed about the eighth day.

CHAPTER V.

BITCH SPAYING

Objects and Indications—Bitches are spayed to prevent estrum (heat) and breeding. A bitch in heat is an ideal illustration of a private as well as a public nuisance. She is undesirable at home and unwelcome abroad. To obviate this, spaying is the only recourse. The spayed bitch is a more desirable animal in many respects than the unspayed one. She remains

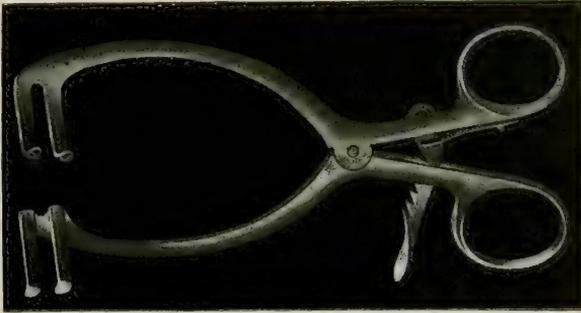


Fig. 180—Wound retractor actual size.

contented at home. She is more kind, docile and reliable than the entire bitch.

Age—To secure the best results it is advisable to spay the bitch puppy before she comes in estrum for the first time. The preferable age is three to six months, though many operate before the puppies are weaned. Aged



Fig. 181—Surgeon's full curved needle No. 5. actual size.

bitches that have given birth to several litters of puppies sometimes develop a tendency to lay on excessive fat when spayed; this is particularly true of collies. The reason for this is not clear. It may be due to contentment with its lot, which occasions less exercise than running over half a township, and the further fact that being at home all the time, meals are more regular and more numerous for the spayed animal than for the prowling nuisance.

Season—Anytime when the animal is not in heat.

Preparation—An empty alimentary tract is an important aid to spaying. Food should be withheld for twelve hours previous to the time of operating, and a dose of castor oil should be administered. An enema and an emetic (morphin or II-M-C given as a preliminary part of the anesthesia is amply sufficient) given one hour before the operation is good surgical practice and contributes not only to the safety of the operation, but adds to the comfort of the patient following the operation and hastens convalescence.



Fig. 182—Uterine sound.

Methods of Operating—There are two methods of operating, viz.: the flank method and the belly method. Ninety per cent of the surgeons prefer and advocate the belly method, while others use the flank method. The author much prefers the belly method.

Anesthesia—Under no circumstances should this operation be performed except under anesthesia. The dog takes general anesthetics, chloroform, A. C. E., ether, A. C. E. and aromatic spirits of ammonia, easily and safely and skilled assistance is not necessary for their administration; it being



Fig. 183—External and internal genital organs of bitch. A, Vulva; B, vagina; C, uterus; D, D, horns; E, E, ovaries (diagrammatic).

practicable for the surgeon to both anesthetize the patient and perform the operation. If chloroform be used, its administration should be preceded by a hypodermic injection of II-M-C, morphin or atropin. Either the II-M-C, or the morphin dulls the sense of pain, and under some circumstances it may be excusable to operate without other means for lessening the pain,

but certainly it is unthinkable not to use at least this. With either the H-M-C or morphin, less chloroform is required than where chloroform alone is used, and the anesthesia is sufficiently lasting to permit the operator to perform the whole operation, once deep anesthesia is induced, without further administration of chloroform. This is a great advantage where the services of a skilled assistant are not available. Where skilled assistance is available, A. C. E., ether, or A. C. E. and aromatic spirits of ammonia have the advantage that the patient recovers from the anesthesia far more quickly. H-M-C, morphin, and atropin all three reduce the danger attendant upon the administration of chloroform to the dog to almost nil, and the employment of at least one of them should never be neglected. When skilled assistance is available and one of the other general anesthetics mentioned, i. e., one containing ether, is used, the hypodermic is not necessary to reduce the danger incident to the general anesthesia nor is any of them so effective when the other anesthetics are used.

Instruments—1. Miles' hooked knife (Fig. 25.) 2. Canine and feline emasculator (Figs. 102 and 103). 3. Wound retractor (Fig. 180). While the wound retractor is not essential for the experienced operator, neverthe-

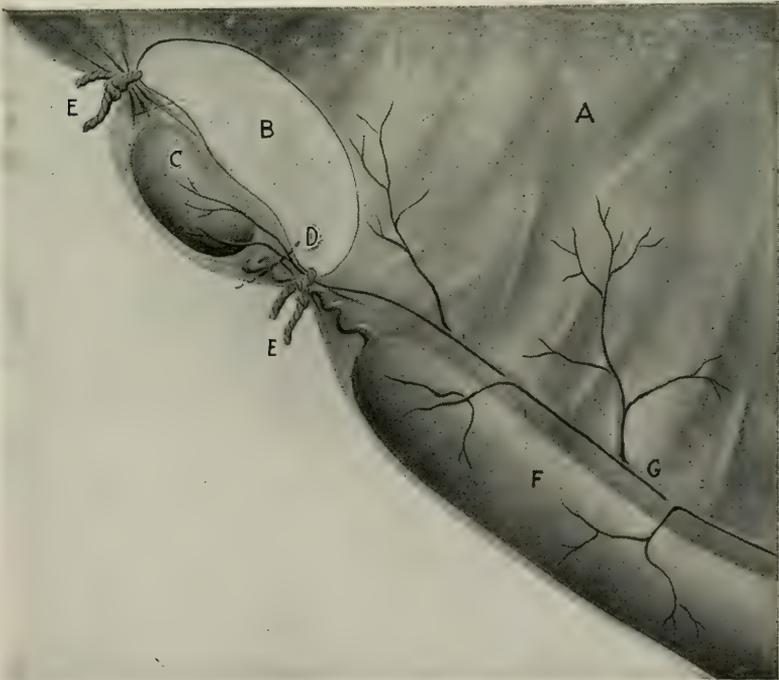


Fig. 184—A, Broad ligament; B, rent in ligament; C, ovary; D, fallopian tube; E, E, ligatures; F, horn; G, artery.

less for the beginner its use greatly facilitates locating the horns of the uterus by enabling him to view them inside the abdomen. If the horns are seen they can be grasped readily with hemostatic forceps and withdrawn without introducing the finger into the cavity. 4. Surgeon's needle (Fig.

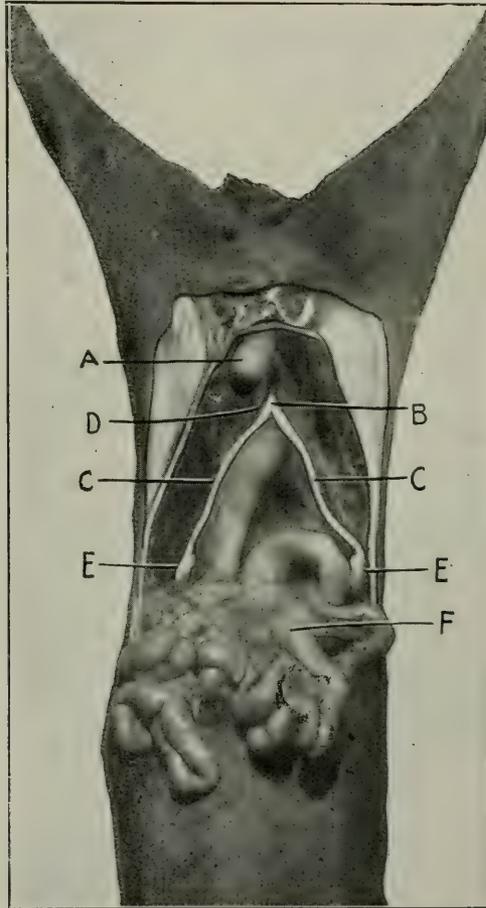


Fig. 185—View of the interior of the abdominal cavity of the bitch, showing the internal genital organs and their relation to each other. A, Urinary bladder; B, uterus; C, C, horns; D, bifurcation of horns; E, E, ovaries; F, intestines.

181), carrying 20 inches No. 10 braided silk for sutures. 5. Uterine sound (Fig. 182). 6. Hemostatic forceps. 7. Richter's needle-holder (Fig. 34).

Anatomy—There is little doubt that, on account of its anatomical conformation—except for the cat, the bitch is the most tedious and difficult of all domestic animals to spay. To make satisfactory progress in bitch spay-

ing the operator must be familiar with the anatomy of the organs and the parts involved.

Vulva—The vulva has thick labia which form a pointed inferior commissure.

Vagina—The vagina is tubular in form and relatively long. Its walls



Fig. 186—A practical mode of restraint for spaying. The subject shown is under complete anesthesia.

are thick, consisting principally of circular muscular fibers. It is closely related to the rectum above and the bladder below.

Uterus—The body of the uterus is exceedingly short, rarely exceeding one inch in length. Its two cornua (horns) are long, and their diameters small. They vary in length from two to eight inches, according to the size of the bitch. They lie loosely inside the abdominal cavity, closely asso-

ciated with the intestinal convolutions. Their bifurcation is V-shaped, and takes place immediately above the fundus of the bladder. The broad ligaments are long (Fig. 184). The fallopian tubes are small in diameter and one to two and one-half inches long, depending upon the size and the breed of the bitch.

Ovaries—The ovaries are small and bean-shaped. Their surface is smooth.



Fig. 187—"Farmer" Miles' method of restraint for spaying operation (bitch).

They are enclosed in a peritoneal capsule (sac) and are attached immediately posterior to the kidneys. (Fig. 185).

Sterilization of Instruments and Cleansing Hands of Operator—All instruments, sutures, ligatures, etc., used in connection with the operation should be sterilized by boiling for fifteen or twenty minutes, and then immersed in Lysol or cresolis compound (U. S. P.), one tablespoonful to the quart of water. The hands should be thoroughly cleansed with tincture of green soap and warm water, using a scrub brush, and rinsed in the antiseptic solution previously mentioned.

Preparation of Operative Field—Shave the hair from the site of incision. Wash with tincture of green soap and warm water, using a scrub brush. Mop with ether and paint with tincture of iodin.

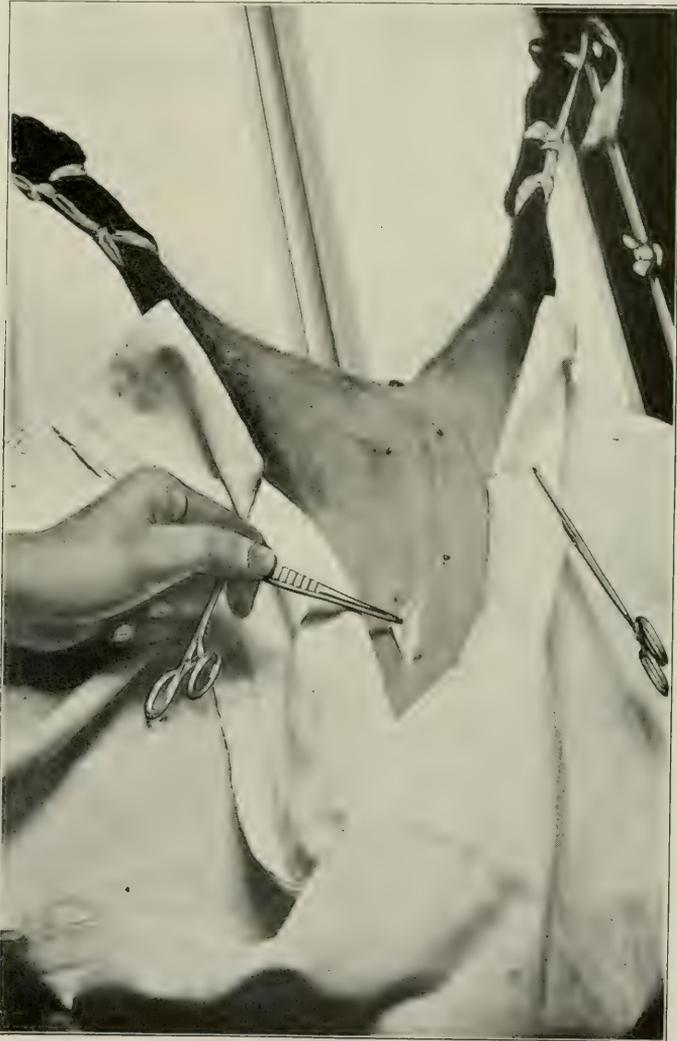


Fig. 188—Showing median line incision, immediately posterior to the umbilicus.

Restraint and Position (Belly Method)—Always apply the muzzle to begin with, and be sure to remove it before anesthesia is complete and if nausea should occur during the administration of the anesthetic, remove the tape at the first evidence of retching. If a suitable operating table is

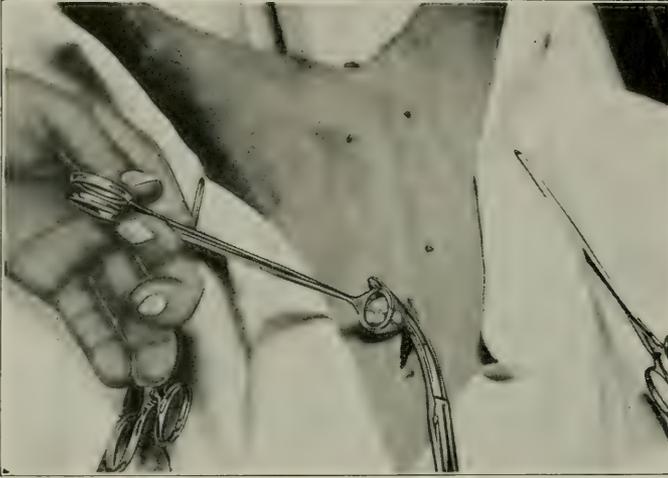


Fig. 188—Completing the process of limited torsion for amputation of the ovary.

available it should be utilized. What is meant by a suitable table is one the top of which may be elevated to the perpendicular or almost perpendicular position. Tables made with stationary tops have no place in this operation. If a table is not available, an inexpensive as well as a safe and satisfactory method is to use a plank that may be stood against a building at a steep slant, or after anesthesia is complete, the patient may be suspended by the hind legs against the side of a building or a post.

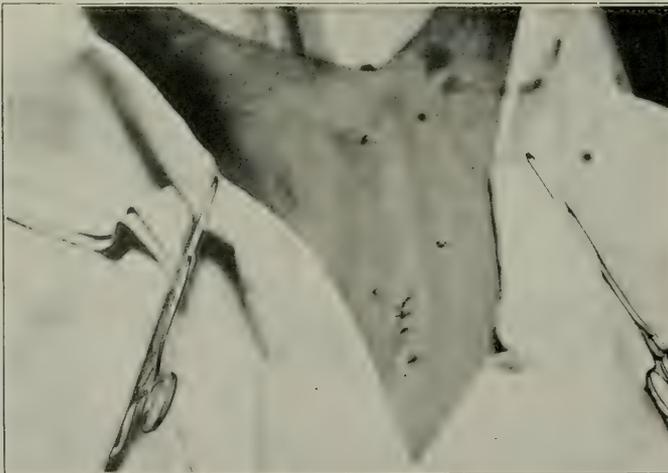


Fig. 190—Showing the skin and fascia joined with a continuous suture, which is fixed by tying together the single end of the thread on one side with the double end on the other.

The method of restraint for spaying bitches designed, taught and practiced by "Farmer" Miles (Fig. 187) is as follows: A tape muzzle (F) is applied. With a strong cord looped above the hocks (B-B) and thrown over a spike or hook (A) in a post or wall (C) the animal is suspended sufficiently high for the site of operation to be on a level with the operator's breast. With another strong cord (D) looped above the elbows (E-E), the operator's leg (G) is placed through its loop for the purpose of making sufficient downward traction to limit the movement of the animal. In this position the intestines gravitate downward against the diaphragm, facilitating the location and removal of the ovaries.

Operative Technic—The incision should be made as exactly in the median line as possible and just posterior to the umbilicus. It should be one inch

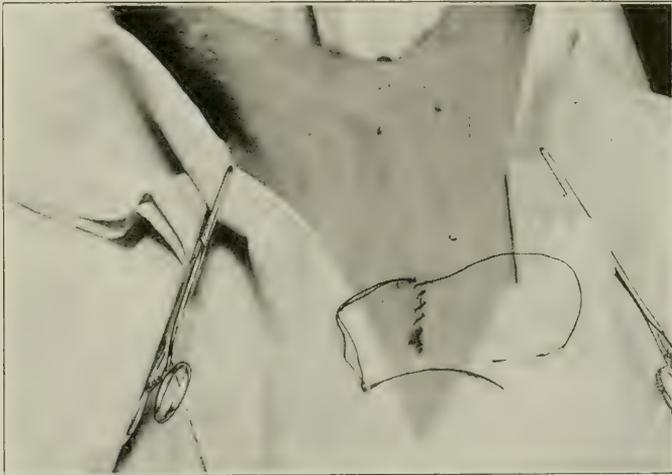


Fig. 191—Showing suture for coaptation of the peritoneum and abdominal muscles.

to one and one-half inches long and penetrate all layers of the abdominal wall, care being taken not to injure the bladder with the point of the knife. (Fig. 188). If preferred there is no objection to introducing the wound retractors, in which event if the animal is empty and the light bright—either the horns or the uterus may be seen plainly. With either tissue or hemostatic forceps the horn is picked up and drawn out of the abdominal incision and grasped between the index and second finger of the left hand. With a limited amount of traction on the horn and by pushing in on the belly to bring it as close as possible to the attachment of the ovary, the latter is readily brought through the incision and outside the abdomen, when together with all its capsule and a portion of the broad ligament it is removed with the emasculator. Unless the bitch is aged or

near the period of estrum, or the ovary inflamed no means of hemostasis is required other than that furnished by the emasculator. If any of the three conditions enumerated above obtain, the larger blood-vessels should be ligated with catgut. Bitches, particularly of the small delicate breeds, do not stand the loss of blood at all well, and spaying them should not



Fig. 192—Abdominal incision.



Fig. 193—Removing Ovaries with emasculator. I, Bifurcation; J, J. horns; K, ovaries; L, emasculator.



Fig. 194—Incision closed with 3 interrupted sutures.

occasion the loss of more than a few drops of blood; in no case to exceed one dram.

With the free end of the tube and ovary in one hand, the horn is followed up to its bifurcation, when the opposite horn is grasped and the opposite ovary located and removed from the abdomen in like manner. The stump of the tubes and horns are replaced in the abdominal cavity. It is

essential that all ovarian tissue and all the capsule be removed. If even a minute portion of the ovary or of the capsule be left, ovarian tissue will be regenerated in many cases and the animal will come in heat again and be as great a nuisance as before, a constant reproach to the operator, and a serious reflection upon his skill, since no excuse can be made for such bunglesome work. Dry the wound by sponging and close either with two or three interrupted through-and-through sutures, or suture the peritoneum with a continuous suture and the abdominal walls with another suture of the same kind. Keep the patient in a warm place until it has completely recovered from all effects of the anesthetic. Chilling, which occurs very readily, and particularly so if morphin has been given, is dangerous following anesthesia. If the pulse is very weak, use hotwater bottles and blanket warmly. Use strychnine (1-300 to 1-150 of a grain) when indicated.

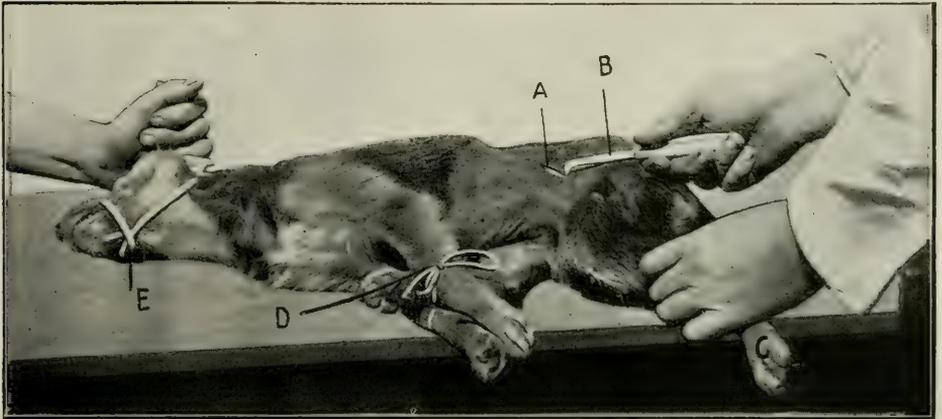


Fig. 195—Bitch spaying (flank method). A. Abdominal incision; B, knife; C, left leg; D, three legs tied together; E, tape muzzle.

If inexperienced, the operator may find the introduction of a uterine sound or probe (Fig. 182) into the vagina an assistance in finding the uterus and horns.

After-Care—All violent or strenuous exercise for a period of a week to ten days after the operation should be avoided. Laxative feeds are an advantage and sometimes mild cathartics are needed. Remove the sutures in from three to five days, depending upon the condition of the wound.

Sequelae—The chief sequelae are shock, internal hemorrhage, peritonitis, hernia, anorexia, eventration, recurrent estrum and adhesions.

1. *Shock*—The preoperative administration of atropin or morphin lessens the liability of shock. Where it is not used and the general anesthetic is pushed too fast and too far, respiration may be suddenly arrested, and

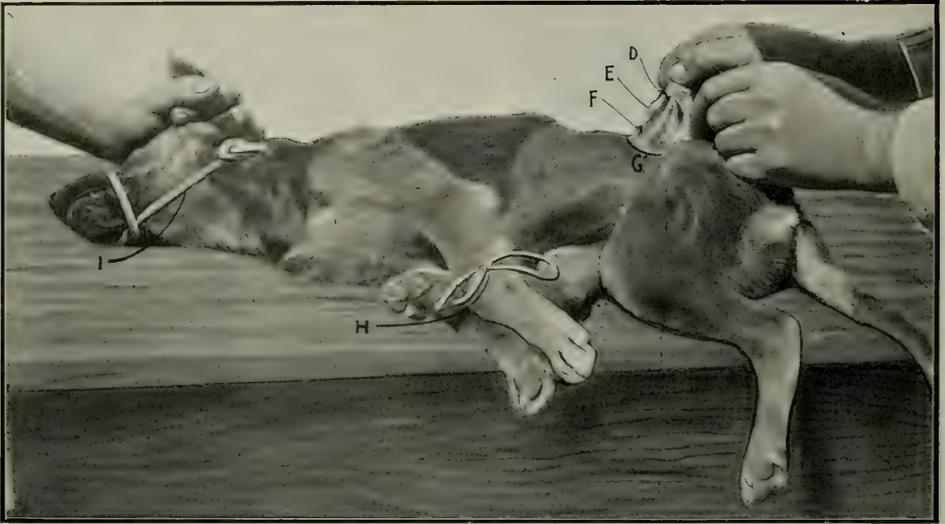


Fig. 196—Bitch spaying, (flank method).

the operator should always watch for this when operating without a skilled assistant to administer the anesthetic. Shock is mostly due to faulty technic.

2. *Internal Hemorrhage*—Bitches in the early stage of estrum or but recently passed through it will occasionally be operated on in spite of one's



Fig. 197—Wound closed by interrupted sutures.

attempt to avoid operation at this time, and in such cases, unless the large arteries supplying the ovaries are ligated, serious and even fatal hemorrhage is prone to result either at the time of the operation or within an hour thereafter. When hemorrhage is discovered during the operation, the bleeding vessels should, of course, be ligated. When it is not discovered until after the abdominal wound is sutured, an attempt to arrest it should be made by the administration of full physiologic doses of atropin, administered hypodermically. If this, with the lowering of the blood pressure, does not arrest the hemorrhage, the wound must be reopened, enlarged if necessary and the bleeding vessels taken up and ligated. Following this,



Fig. 198—Protection of wound after spaying.

artificial heat should be supplied by means of hot-water bottles. A copious interabdominal injection of normal saline solution should be given where the loss of blood approaches the danger point.

3. *Peritonitis*—Peritonitis may, of course, result from infection, a sequel to unclean work, or from rough handling of the abdominal viscera. The epithelial layer of the peritoneum of all puppies and of adults of the toy breeds is so delicate that abrasions may be caused by the fingers, to say nothing of the finger nails. Anything but the gentlest of manipulation and very little of that is not only unnecessary in spaying a bitch, but very harmful. Peritonitis due to infection is usually fatal. That due to trauma-

tism usually ends in recovery, but not without more or less extensive adhesions. A good technic will avoid both kinds.

4. *Hernia*—Hernia is of two kinds, omental and intestinal. The latter occurs only when the sutures are too wide apart and gaping wounds left. Omental hernia may occur from an insufficient number of sutures or from the sutures being improperly placed. If the through-and-through suture is used, care must be taken in every case to see that all layers of the skin, muscles and peritoneum are included in each suture. If the peritoneum and abdominal walls were sutured separately, both, and particularly the peritoneum, must be so sutured as to leave no gaps.

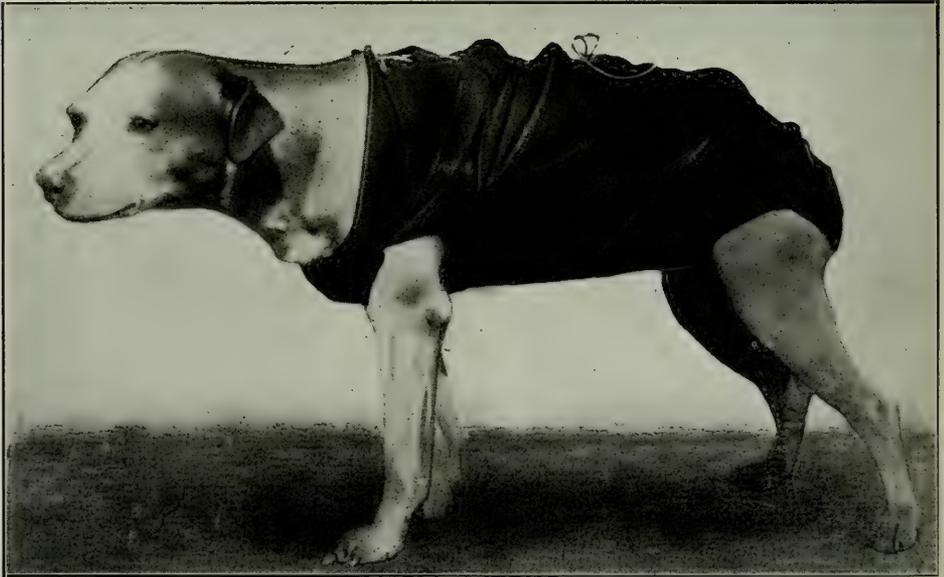


Fig. 199—Protection of wound after spaying.

5. *Anorexia*—This may result from the misuse of anesthetics, from a failure to empty the intestinal canal before operating, from constipation following the operation, and of course, from peritonitis. Its treatment consists in removing the cause, or better still, in avoiding it.

6. *Eventration*—The tendency of some animals to self mutilation and eventration from the fourth to the eighth day following spaying has never been satisfactorily explained. Rough manipulation of the abdominal viscera is believed to be an important cause. Shutting the animal up away from others with which it has been accustomed to associate, or away from its owner and the resulting homesickness and nervousness is probably a contributing factor. It may be prevented by putting a stiff wide collar on the

animal, so wide and so stiff that she cannot turn her head sufficiently to get her teeth to the abdomen. It is uncommon and so far as the writer knows, has not occurred with bitches returned to their owners immediately after spaying, but does sometimes occur to those confined in a veterinary hospital for a week following the operation.

7. *Recurrent Estrum*—This can occur only when the animal is not properly spayed. If any part of an ovary or its capsule is left attached to the broad ligament, estrum is prone to recur after a time. The only treatment is to operate again, and as this operation is far more difficult than spaying a normal bitch, it should be left to an experienced operator, a thing that it goes without saying, the one who left the ovarian tissue was not.

8. *Adhesions*—Adhesions, unless extensive, seem unimportant. Perhaps they cause pain as they do in man, but it is not so apt to be discovered. Extensive adhesions such as are quite apt to follow prolonged, bunglesome searching for the ovaries at the time of operation, or infection, render the bitch practically useless.

There is one other sequel of spaying about which little has been said, but it occurs to annoy the operator sometimes. Bitches that are operated on during the period of estrum or when pregnant sometimes exhibit great listlessness about three weeks following the operation, which grows progressively worse until the animal scarcely notices anyone and lies about most of the time. When it is induced to move, it walks with a staggering gait, and may even be partially paralyzed in the hind legs. Recovery is ordinarily spontaneous in five or six weeks. No treatment so far used has appeared to be of any benefit.

CHAPTER VI.

CAT SPAYING

Objects and Indications—Cats are submitted to spaying operation for the purpose of preventing “heat” and pregnancy, principally the latter. After spaying they remain at home more closely and are more desirable pets.

Age—The best results are attained if the cat is spayed before she comes in “heat” the first time. On account of the smallness of the cat—especially

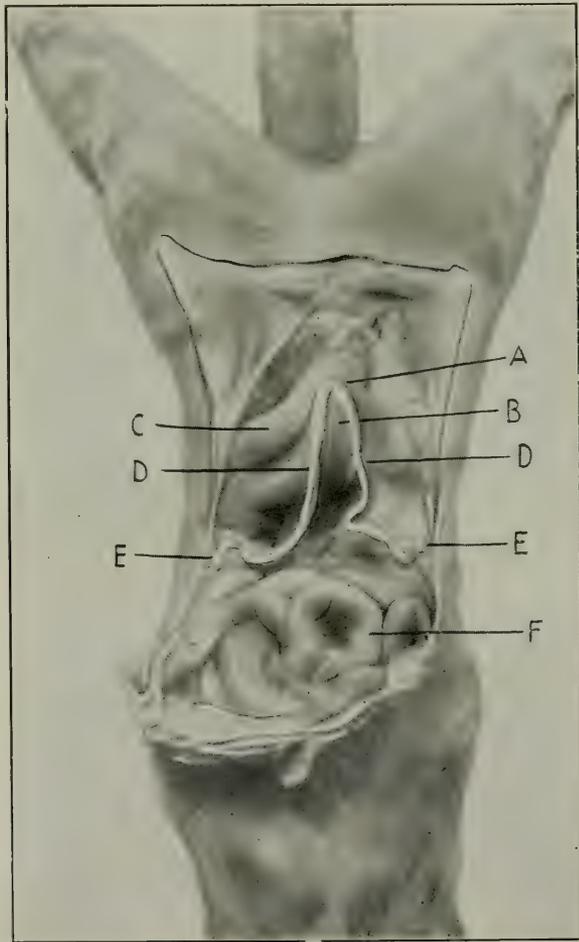


Fig. 200—View of interior of abdominal cavity of the cat. A, Bifurcation; B, rectum; C, bladder; D-D, uterine horns; E-E, ovaries; F, intestines.



Fig. 201—External and internal genitalis of the cat.

if an attempt is made at an early age—the operation is extremely tedious. It is best to operate at 6 to 8 months old.

Season—Winter, spring and fall.

Preparation—Withhold food for twenty-four hours previous to operating in order that the alimentary tract may be empty.

Methods—Flank method and belly method.

Anesthesia—General anesthesia should be employed on account of a natural as well as an acquired tendency to bite and scratch ferociously whenever submitted to operation of almost any character. Control without anesthesia is somewhat hazardous.

Instruments—1. Miles' hooked knife (Fig. 25). 2. Canine and feline emasculator (Figs. 102, 103). 3. Wound retractor (Fig. 180). 4. Sur-

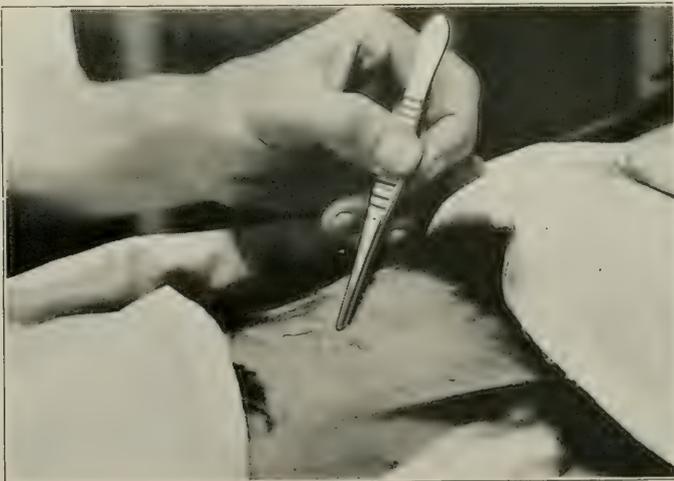


Fig. 202—Flank incision for spaying the cat.



Fig. 203—Cat tied and in proper position for flank spaying. A, Incision; B, legs

geon's full curved needle No. 5 (Fig. 181), carrying 18 inches sterilized braided silk No. 10. 5. Long, slender probe. 6. Hemostatic forceps.

Anatomy—The cat is the most difficult and tedious of all domestic animals to spay. The anatomical conformation and smallness of the parts and organs largely account for its extreme tediousness. As for the author's part he would greatly prefer spaying ten heifers to one cat. In fact, he would prefer spaying twice ten heifers to spaying one kitten. The internal gener-

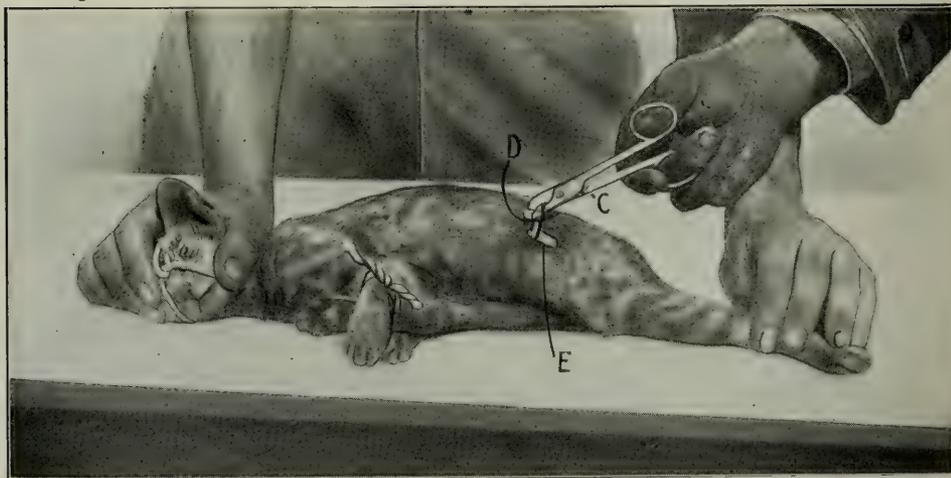


Fig. 204—Cat spaying (flank method). C, Emasculator; D, ovary; E, abdominal incision.



Fig. 205—Wound closed with two interrupted sutures. F, Sutures.

ative organs of the cat are similar in all respects to those of the bitch except, of course, that they are much smaller. Their conformation and anatomical relation are the same in both animals. (Figs. 200 and 201.)

Sterilization of Instruments and Cleansing Hands of Operator—Same as for bitch spaying. See page 194.

Preparation of Operative Field—Same as for bitch spaying.

Operative Technic—Same as for bitch spaying.

After-care and Treatment—Same as for bitch spaying.

Sequelae—Same as for bitch spaying.

CHAPTER VII.

POULARDIZING

The operation of poulardizing simply means unsexing the female fowl; in other words, spaying the pullet.

Objects and Indications—The primary object in making poulards of pullets is to facilitate their growth to quick maturity without the handicap of egg production. It is a positively known fact that the poulards mature and develop more rapidly than entire pullets or hens. The texture, flavor and nutritive properties of their meat is also greatly improved. Poulard meat bears the same relation to that of the hen as the meat of a spayed heifer to that of the old cow. The operation has been practiced on a large scale for many years in France and Germany, and to a limited extent in America. The results would justify its more universal adoption. The poulard never cackles, and like the capon becomes an outcast.

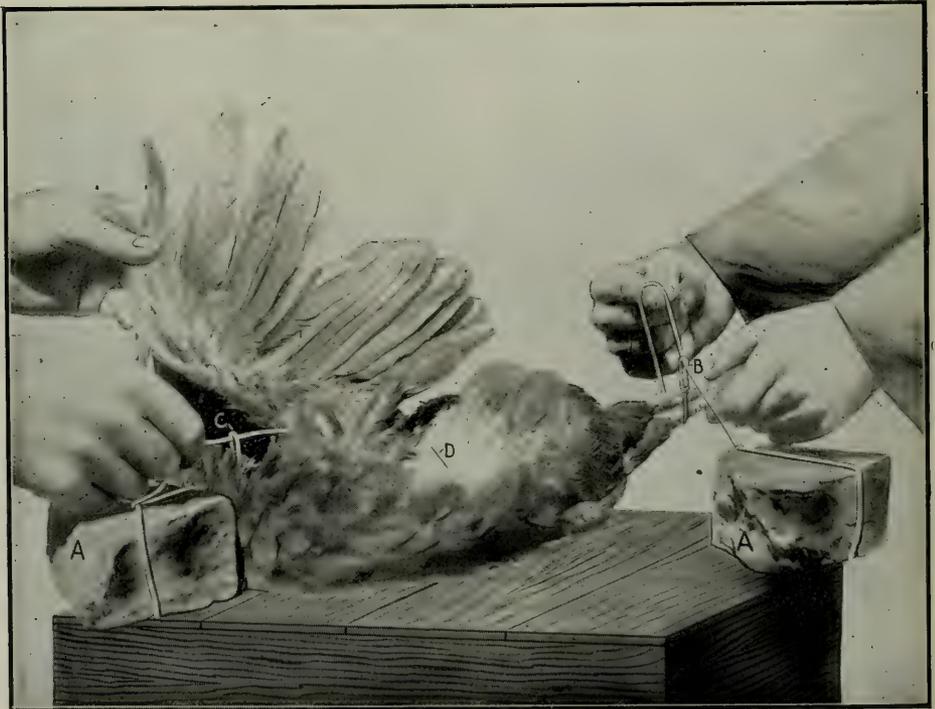


Fig. 206—Restraint for poulardizing. A-A, Weights at end of cords; B, leg of fowl in loop; C, wings in loop; D, incision

Age—Two to three months.

Season—Late spring, summer and early fall.

Preparation—Withhold all food for at least thirty hours before operating. It is impossible to do a satisfactory operation on a pullet with a full alimentary tract. A full abdominal cavity prevents locating and examining the egg cluster, to say nothing of its interference with the operation itself.

Restraint—On a box or barrel acting as an operating table the pullet is confined for operation in the same manner as for caponizing. Two pieces of strong cord are procured, upon each end a loop is made. To one end a weight is attached (Fig. 206), after which the free end of one cord is looped above the feet and the other cord is looped around the wings. The

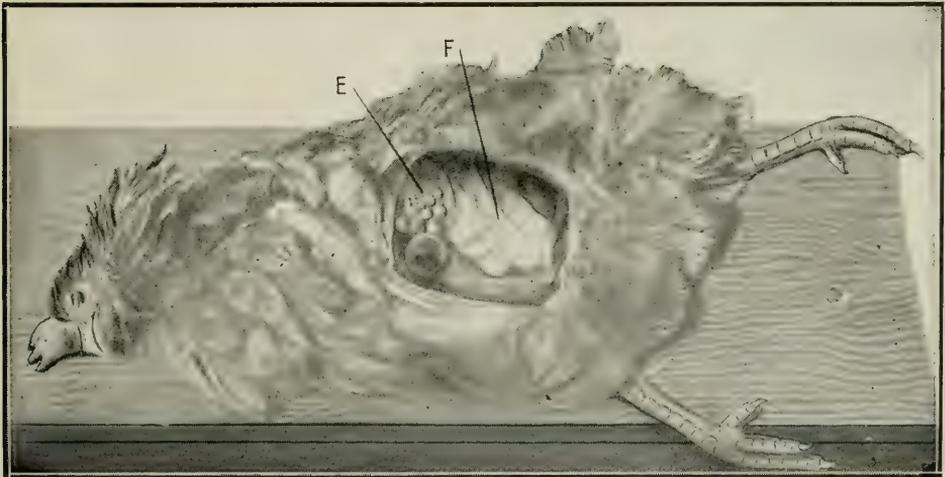


Fig. 207—Internal genital organs of hen. E, Egg cluster; F, egg passage.

pullet is now stretched full length—left side uppermost—on the table. This is a quick and inexpensive method of restraint and at the same time a satisfactory one.

Instruments—1. Caponizing knife (Fig. 116). 2. Spreaders (Figs. 117, 118, 119). 3. Hemostatic or tissue forceps (small size). 4. Curved scissors (Fig. 35).

Breeds—It is not profitable to attempt to make poulards from the small breeds of chickens. Indian Games, Brahas, Cochins, Langshans, Plymouth Rocks, Orpingtons, Wyandottes, etc., all make good poulards.

Anatomy—Some knowledge of the anatomy of the parts involved and their relation is necessary before progress can be made with this operation. Fig. 207 shows the egg cluster (E) which corresponds to the ovary in animals, and the egg passage (F) which corresponds to the uterus in

animals. This illustration was purposely made from a grown hen. One object being to enable the amateur operator to know the comparative difference between the internal genitals of a hen and those of a pullet of proper age and size for operation. Fig. 208 shows the organs after being removed from the abdominal cavity of the hen. They consist of (A) egg

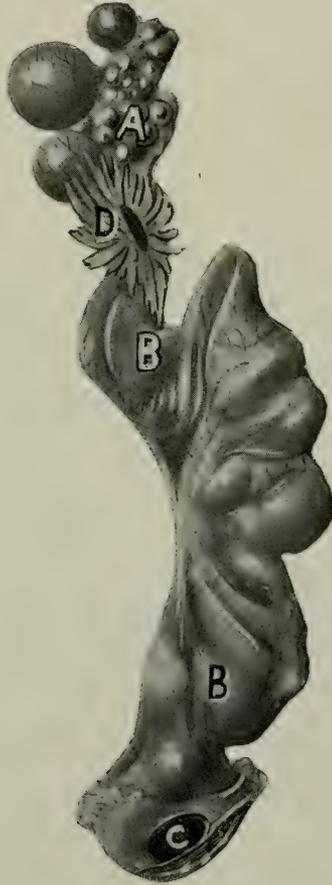


Fig. 208—Internal genitals of hen. A, Egg cluster; B-B, egg passage; C, cloaca; D, frimbriated extremity of fallopian tube.

cluster, (B-B) egg passage, (C) cloaca, (D) frimbriated extremity of the fallopian tubes. The egg cluster lies in close proximity to the vertebral column, slightly posterior to the lungs. From it the fallopian tube and egg passage proceed backward—in close relation to the vertebral column, aorta and vena cava—to its outlet—cloaca. In the pullet the egg cluster and egg passage are small. (Fig. 209.)

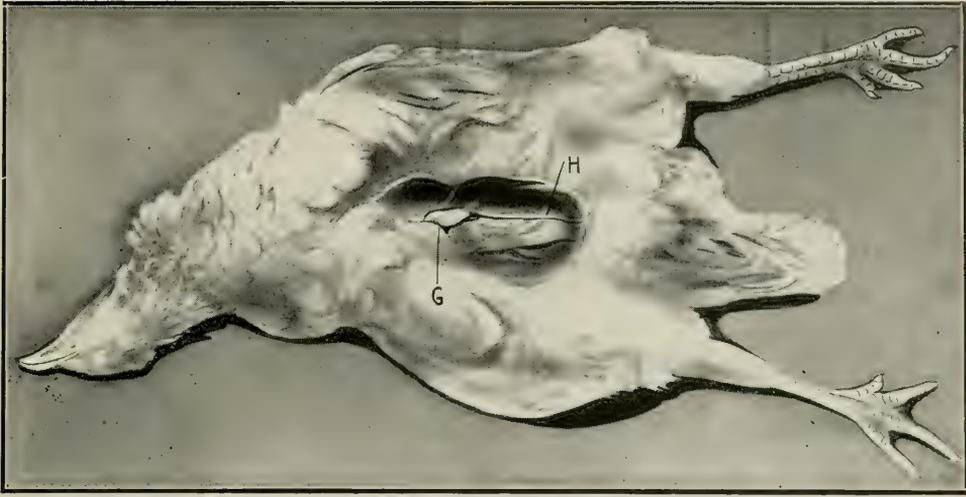


Fig. 209—Intestines removed to show position of egg cluster and egg passage.
G, Egg cluster; H, egg passage.



Fig. 210—Making a poulard. E, Abdominal incision; G, spreaders; F, thumb forceps.

In a pullet of proper age for operation the egg passage is no larger than an average size broom straw. The egg cluster in such a pullet is small and flat, and shows no evidence of egg formation. Beginners are urgently advised to carefully examine these parts in the carcass of the mature hen, also in a three-months-old pullet before undertaking the operation.

Warning—In removing a section from the egg passage caution should be exercised not to sever either the aorta or vena cava. Both are large and important blood-vessels, and should either of them be severed, death from internal hemorrhage is almost instantaneous. It is important to have extra

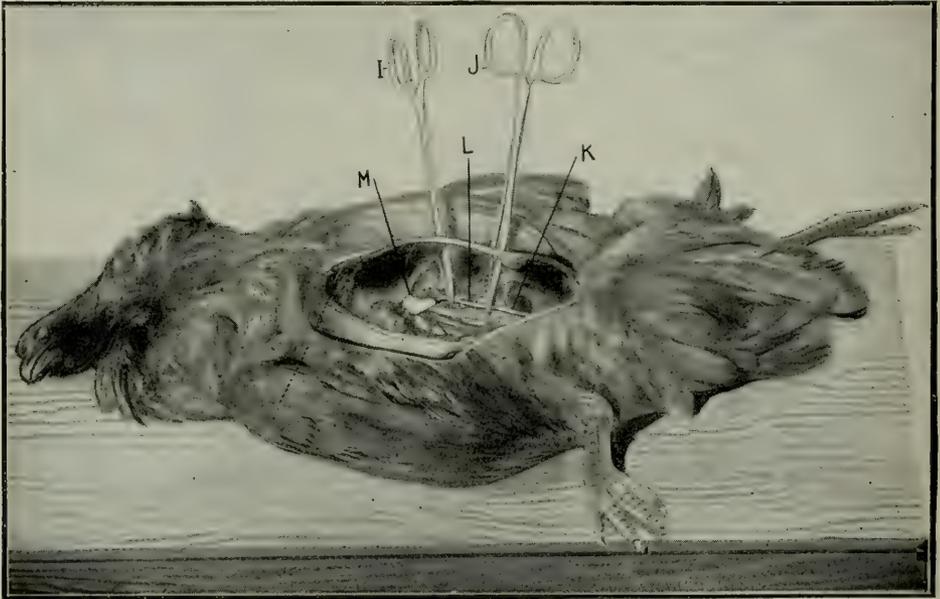


Fig. 211—Removing a section from the egg passage. I-J, Forceps; K, egg passage; L, section of egg passage between forceps to be removed; M, egg cluster.

good light in order that the abdominal cavity be illuminated sufficiently to locate the parts. Bright sunshine is the ideal light for this operation. Out-of-doors is the place, and from 10 a. m. to 2 p. m. is the best time.

Operative Technic—With the left side uppermost the feathers are plucked from the site of incision—last intercostal space. The skin is chilled by allowing a glass of cold water to slowly trickle over it. This chilling process has a tendency to reduce capillary hemorrhage from the skin. With the knife begin high up between the last two ribs and make an incision 1 to 1½ inches long, severing the skin and both layers of the intercostal muscles down to the transparent peritoneum. Since the intercostal artery follows

closely the posterior border of the rib this incision should be made as close to the anterior border of the last rib as possible. The spreaders are now inserted. This opens the wound, and through the transparent membrane (peritoneum) covering the intestines the egg cluster is examined. If there is evidence of advanced egg formation it is not profitable to make a poulard. It is more profitable to release the hen for egg production, in which event the abdominal cavity is not opened. The spreaders are simply removed and the fowl released. On the other hand, if, upon examination of the egg cluster—through the transparent peritoneum—there is no evidence of egg formation the peritoneum is nicked sufficiently to open the abdominal cavity. Beginning close to the egg cluster a one-inch section of the egg passage is removed with forceps and scissors. This stops egg formation. By reference to Fig. 211 an idea may be had of the exact location of the egg passage and the part of it to be removed in operating. The spreader is now removed. This allows the ribs to come together, automatically closing the incision.

After-Care and Treatment—Upon being released from the operating table poulards are usually put in a closed yard where they can find shelter, food and water, and can be kept quiet. No roosts are provided, as the less flying and jumping they do the sooner the wound heals. The poulards seem to be very little inconvenienced by the operation, and water and soft feed mixed with sweet skim milk may be given immediately. Some feeders give this in unlimited quantity, while others feed more sparingly for a time.

For a week or ten days the newly made poulards should be carefully observed to see whether they become "wind-puffed." This is a condition caused by air gathering under and puffing out the skin near the wound. When observed it can be readily relieved by pricking the skin with a needle or knife and pressing out the air.

CHAPTER VIII.

DEODORIZING THE SKUNK

While removing the scent from a skunk has not the remotest relation—either directly or indirectly to animal castration; nevertheless, on account of its novelty and the dearth of reliable literature on the subject the author considers it of sufficient interest and importance for brief mention in the concluding pages of this volume.

Objects and Indications—It should be remembered that the skunk has no effective means of protection or defense aside from the scent fluid which it possesses and uses without stint when necessary. Ordinarily, the fluid discharged by the skunk is amply sufficient to ward off almost any kind of attack and protect the animal from danger. The scent fluid is only discharged when the animal is alarmed or frightened, and contrary to the prevailing popular opinion, is not urine, and has no connection with the urinary apparatus. Skunks are deodorized for the purpose of converting

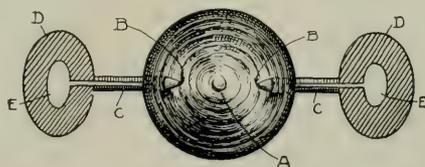


Fig. 212—Diagrammatic illustration showing scent secreting and expelling apparatus. A, Anus; B-B, jet or nipple-like opening of anal ducts; C-C, ducts; D-D, anal glands; E-E, sacs or reservoirs.

them into desirable household pets. Such animals never scratch and rarely ever bite, and are absolutely harmless.

Age—They should be operated upon at an early age (30 to 60 days old), as the mortality rate following operation in the mature skunk is very high.

Season—Whenever you can succeed in catching them. This is one animal at least you must catch before you can operate upon it.

Preparation—If possible the young animals (kittens) should be kept and fondled for several days before they are submitted to operation, so they may become accustomed to being handled. By thus preparing them they may be handled through the preparatory stages of the operation without voiding the scent fluid.

Restraint—The operation must be done under a glass to protect operator and assistants. A large pane of window glass should be supported at each end and raised about ten inches from the floor. Two assistants are necessary.

Rubber gloves should be worn by the operator and both assistants. The skunk is readily placed under general anesthesia by the use of ether when such is desired. The animal is carefully placed under the glass, after which one assistant should grasp the head and fore feet and the other assistant the hind feet, and hold the posterior parts in such a position as to cause the discharged scent fluid to be deposited against the under side of the glass. Most of the fluid will be discharged at this time quite promptly, and

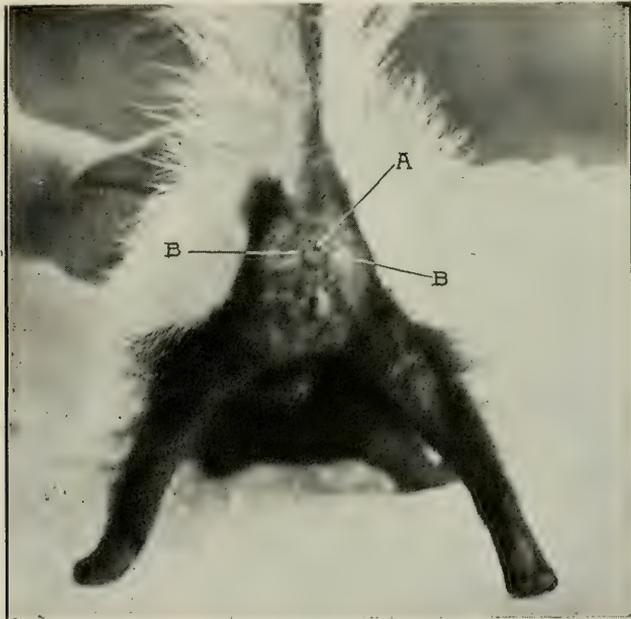


Fig. 213—Posterior aspect of the skunk. A, Anus; B-B, anal glands.

very little will be kept in reserve. In fact, the operation could be proceeded with to completion without the glass.

Instruments—1. Scalpel. 2. Rat-tooth hemostatic forceps. 3. Curved scissors (Fig. 35).

Anatomy—The anus is a large irregular elliptical depression surrounded by loose flabby skin which bulges over the site of the anal (scent) glands. These glands are two in number located on each side (laterally) of the anus. There is about one-half inch space between the anus and the center of the anal glands.

The scent-secreting apparatus is large, and consists of numerous small glands—closely associated—surrounding a sac or reservoir for storing up the fluid. They are covered by skin, subcutaneous connective tissue, and



Fig. 214—Showing incisions over site of anal glands. F, Anus; E-E, incisions.

two thin layers of muscular fiber, viz.: ischio-cavernosus and bulbo-cavernosus muscles. The glandular organ is surrounded by a well defined envelope. Each gland is supplied with an excretory duct. These ducts project through the lateral walls of the rectum immediately anterior to the anus. Their openings are nipple or jet-like for governing the direction of the stream. When the skunk considers itself in danger its behavior is as follows: 1. It turns its posterior parts toward the object of attack. 2. Elevates its tail. 3. Inverts the anus exposing the nipple-like openings of the ducts. 4. By voluntary muscular contraction the sac or scent reservoir is compressed and the scent fluid expelled. This fluid may be thrown for a distance of twelve to fifteen feet, the direction of the stream being under

thorough control of the skunk. Of course, the amount of fluid is quite limited, but it is usually sufficient. The character of the fluid is dirty brown and fetid, and is slightly phosphorescent at night.

Sterilization of Instruments and Cleansing Operator's Hands—The instruments should be sterilized by boiling fifteen to twenty minutes, and then immersing them in Lysol or Cresolis compound (U. S. P.), one tablespoonful to each quart of water. Wash the hands with tincture of green soap, using a scrub brush, and rinse them with the antiseptic solution.

Anesthesia—The skunk yields readily to ether as a general anesthetic, and it is always advisable to administer such an anesthetic before operating.

Preparation of Operative Field—Don't forget that the skunk is now supposed to be under the glass. Clip the hair from around the anus for a distance—in each direction—of at least one inch. Wash the parts with antiseptic solution and paint the skin over the site of the incisions with tincture of iodine.

Warning—In making incisions and dissecting out anal glands, exercise extreme care in order to avoid injury to either rectal or anal walls, or to the genito-urinary passages.

Operative Technique—Locate the glands—on each side of the anus by palpation. A perpendicular incision one inch long is made directly over the center of the most prominent part of each gland, about one-half inch from the anus. (Fig. 214.) These incisions should penetrate the skin and subcutaneous connective tissue only. With rat-tooth hemostatic forceps or small size vulsellum forceps the glandular organ is grasped, and with limited traction applied by the forceps the parts are isolated by careful dissection, after which the duct is severed close to the rectal wall and the operation is completed. The incision should be left open to heal by granulation.

After-Care—About all that is necessary is to place the animal in warm sanitary quarters. The wounds will heal and complete recovery take place by the tenth day.

CHAPTER IX.

AUTHOR'S IDEAL CASTING HARNESS.

The casting harness illustrated is included in order that those who desire to do so may make, or have made, and use, what, to the author's mind, is the most complete and satisfactory casting harness. Its design is based on twenty years' college teaching and field experience with dozens of casting appliances of most every type.

This casting harness is *not patented* and every student and practitioner has permission to use it in any way he desires.

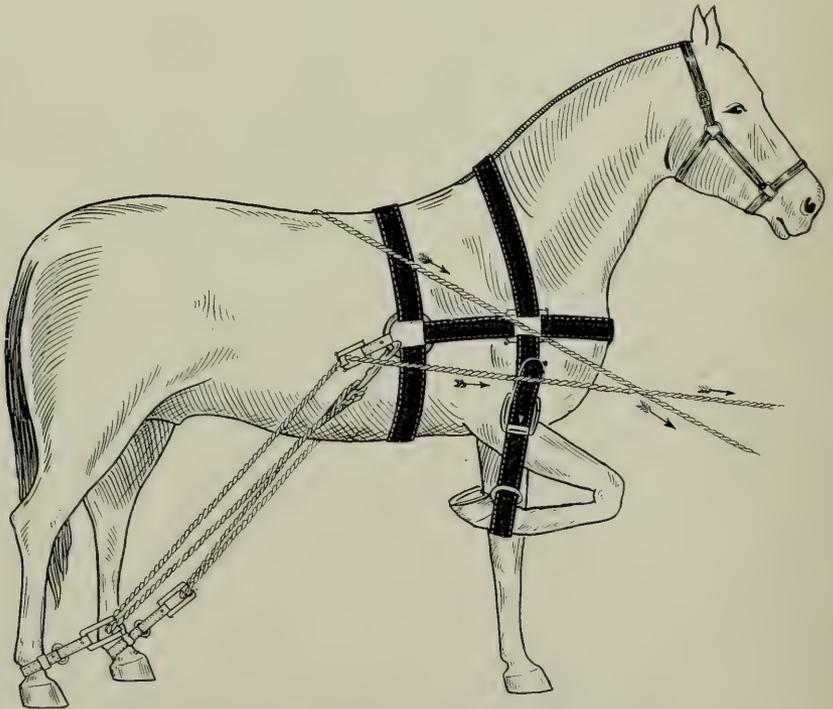


Fig. 215—Author's ideal casting harness applied.

This harness is adjustable in all directions, thus permitting of use on animals of all sizes. The adjusting buckles appear on the opposite side and do not show in the illustration. On account of the great variation in size of horses and mules, no measurements for the harness are given. Select an average size horse and make your own measurements. To make correct measurements is an easy matter when you have an animal and the illustration before you.

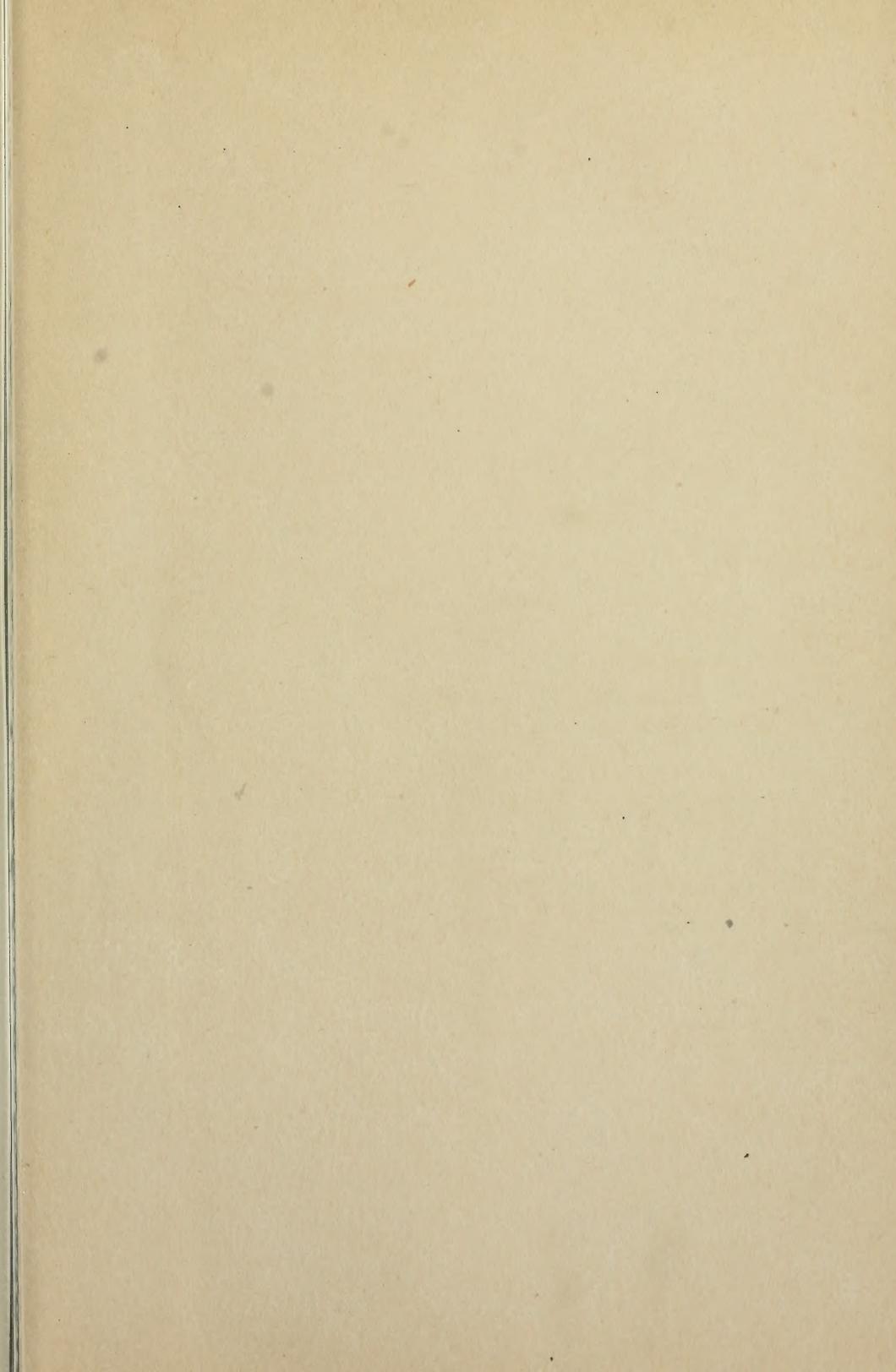
Each of the two side ropes are one-half inch in diameter and thirty-three feet long. One end of each rope is equipped with a strong snap. Friction on the side ropes is reduced to a minimum by the four roller equipped "D's" on the hobble straps and breast collar. Both hobble straps are 18 inches long. In casting and tying, the ropes are pulled in the same direction and handled in the same manner as described in casting and by the Knowles method. Pages 50, 51 and 52.

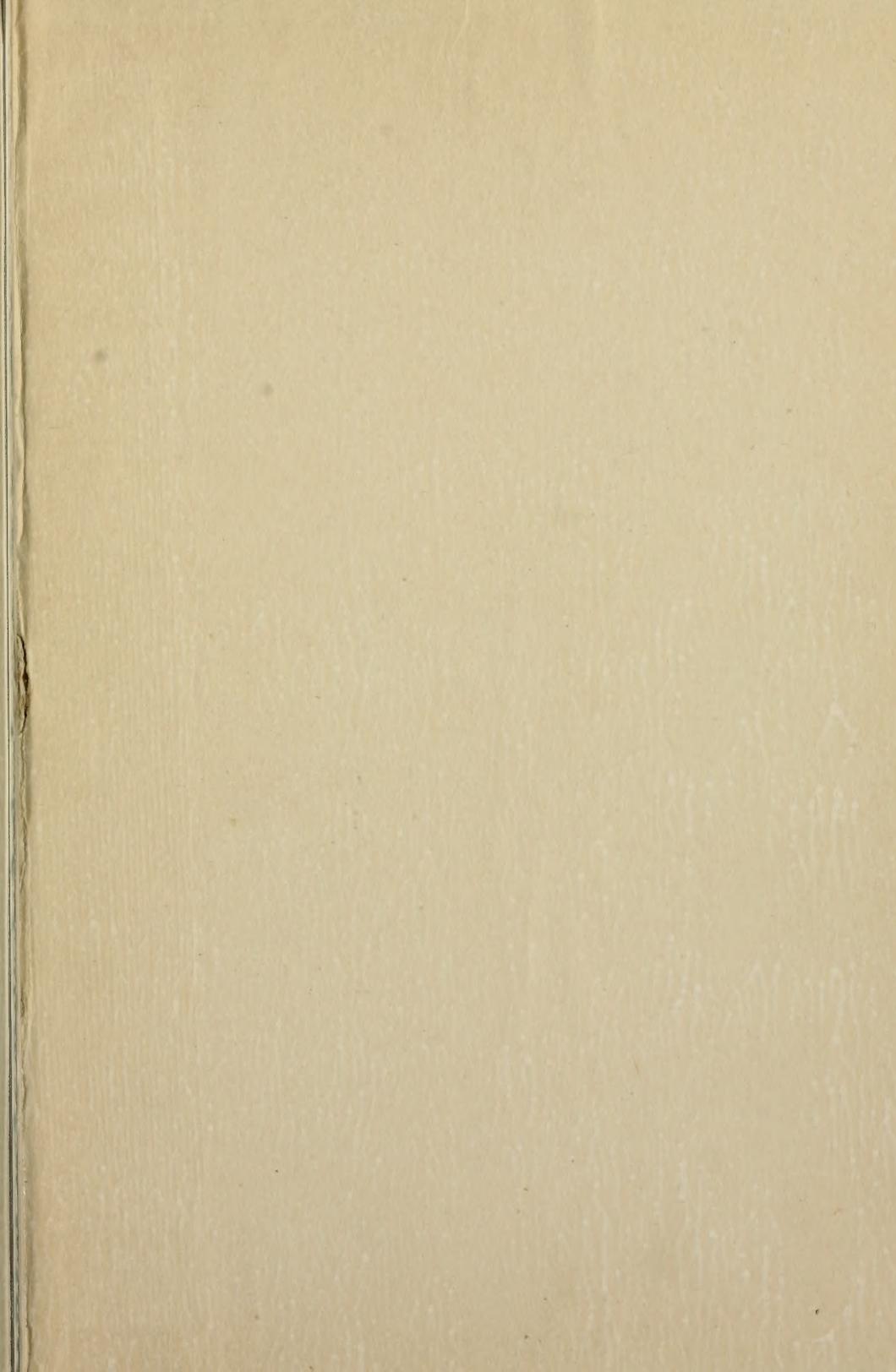
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