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U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY—Circular No. 62.

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A PLAN FOR THE IMPROVEMENT OF
AMERICAN BREEDING STOCK.

BY

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[Reprinted from the Twentieth Annual Report of the Bureau of Animal Industry (1903).]



WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1904.

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The most striking features of agricultural progress at the present time are the intense study which agriculturists, botanists, and horticulturists are devoting to the subject of systematic and practical plant breeding and the very remarkable results which have been reached. New varieties of wheat have been evolved whose productiveness promises to add materially to the country's output of cereals; new varieties of cotton have been perfected; corn has been improved so that it will yield not only a larger amount of grain per acre but produce a higher percentage of protein than was contained in the original varieties, and the statement is now being made that it will probably be but a short time until the nitrogen-gathering bacteria will thrive on the roots of this plant. These achievements have increased directly the production of agricultural wealth.

The methods by which this great work has been inaugurated do not differ widely from those used by animal breeders, for the principles of heredity are undoubtedly the same whether applied to plants or to animals. Selection and pure breeding were potent methods in bringing about the results mentioned above. Both are at the basis of success in animal breeding and have been applied for generations. Both are fairly well understood by stockmen. The third agent, whose use has given tremendous impetus to plant breeding—crossing between varieties and hybridizing between species—is rarely resorted to in animal breeding except for the production of market animals; it is therefore a new field for exploration.

The situation at this time is that the breeders of plants have passed the breeders of animals in this line of work and to-day possess a better insight into the principles underlying their science. This difference can perhaps be ascribed to two causes: The first is that the breeding of animals has been so long a business of recognized standing that its principles are supposed to be established to a certain extent. It will come somewhat as a surprise to say that animal breeding, as a field for scientific investigation having useful purposes in view, is practically unexplored. On the other hand, the prospective investigator of animal breeding, filled with zeal for the study of his subject, has

been restrained by the tremendous difficulties in his path. With animals material is expensive, while with plants it is relatively cheap. With animals offspring are few in number, while with plants the production of thousands of individuals is the work of but a year or two. The animal breeder has heretofore had an advantage in the respect that winter months do not limit his operations, but the plant breeders are meeting their difficulties in this respect by conducting their work under glass.

A feeling is gaining ground that a study of animal breeding similar to that now devoted to plant breeding should be inaugurated. Animal breeders are beginning to note the influence of the activity of their brothers of the plant-breeding fraternity. In their opinion, if the importance of plant cultivation warrants the expenditure of a large amount of energy, thought, and money, the intimate relation of livestock husbandry to successful agriculture, the magnitude of the livestock business in the domestic and foreign trade of the country, and the dependence to a large degree of the nation's life and prosperity, directly or indirectly, on the animal industry, are reasons why so great an effort should be put forth by scientific men and by State and national governments to solve the problems of heredity from the standpoint of the stockman.

On general principles, we should raise the standard of our breeding stock, for it is axiomatic that where there is no progression there will be retrogression. Further evidence of the need for improvement may be found in the variety of types—the striking lack of uniformity—among the exhibits of the same breed that may be seen in any show ring of importance. This is due either to the lack of a well-understood ideal among breeders or to variations in their standards among judges. A breed can not effectively do its share in the improvement of the native stock until its promoters have a definite standard in view, and the breed which is most uniform in the type shown by its individuals will be the one to transmit its characteristics most when its blood is infused into that of native stock.

Another reason why American breeding stock needs improvement may be seen in the large influence exerted upon the stock-breeding interests by animals bred in foreign lands. If breeding animals can be brought into the country each year by the thousand and sold at a profit, and if home-bred animals compare unfavorably with those imported ones when they meet in the show ring, it certainly argues the need of improvement in American breeding stock.

Improved breeds have been established on American soil in two ways—(1) by careful selection among the best individuals of the native stock and pure breeding after the type became fixed, and (2) by direct importation of individuals of breeds already established in other countries and pure breeding from this source, using the foreign book of

record as the foundation of pedigrees. In some instances there have been exceptions to these general rules. Before registrations became extremely rigid in the United States the admission to record of an animal not directly traceable to foreign books was possible among some breeds which had a foreign origin; in other cases the beginning of importations and the establishment of a book of record in the United States preceded and eventually brought about the organization of breeders and the publication of a book of record in the country from which the importations came.

The immediate result of the first method has been the production of breeds of live stock peculiar to our soil and climate. It forced farmers and stockmen to use the material at hand and to build up from the foundation. It compelled them to select their own standards and fix their own types. It concentrated their attention on their own breeding pens, and did not befog their minds with the ideals and methods of breeders 3,000 miles away, under different soil and climatic conditions. It gave the country the American hog, the American trotter, the American saddle horse, the American hen, and the American turkey. It produced the Renick Rose of Sharon family of Shorthorns, and its influence may be seen at this time in the molding of type and form in the beef herds which crowd our show rings. The remote effect was that the breeders of such stock were independent of the influence of those in another country. They were not compelled to accept rules of entry to which they themselves objected and which they did not permit in their own books. Furthermore, it gave American breeders in general a greater pride in their work and greater incentive and called attention to the country's possibilities in stock breeding. Its weakness lay in the fact that, under conditions which have always seemed to require a closed registry, a smaller number of individuals in the breed caused a certain amount of danger from close breeding and precluded the wide range of selection which was possible when breeds were established from other countries. It was a slow and hard method of work. The experience of these breeders was a repetition of the work of the pioneers in England and Scotland, and in some cases the results may not have seemed commensurate with the effort put forth, but they are of permanent value.

The second method has had for its object the development of breeds by direct importations of animals already bred to a high degree of excellence in other countries. It has been the means of establishing the Thoroughbred horse, all our breeds of draft horses, several of coach horses, the leading breeds of beef and dairy cattle, numerous breeds of sheep, and at least three of hogs. While the former method developed breeds by the improvement of the native stock, this method transplanted breeds by importation. It has been the principal means of improvement of American stock.

The immediate results of the importation method are seen in the rapidity with which breeds have been established. In a word, the American importer seemed to begin where the foreign breeder stopped, and breeders in this country were thus saved many years of work. All things considered, the live-stock industry could not, perhaps, have been built up so rapidly without importations. The breeders of Europe had a very considerable start over those in the United States. Further, the system of county breeding, to which Professor Hayes calls special attention, had become a fixity in England long before Bakewell's time. To build up breeds in America in the same manner as had been done in England would require an amount of time and trouble which enterprising pioneers thought might as well be saved. Therefore breeding animals of all kinds were imported, and from the earliest days of the country's history, with the exception of four years only, animals imported for breeding purposes have passed the United States customs free of duty. There have been various modifications of this provision, and regulations are in force to control it, which it is not necessary to discuss here. It is the historic policy of the Government to encourage the introduction of animals from abroad whose use on native stock will improve the breed and not introduce disease. With such encouragement many thousands of animals have been brought to our shores. For a century, but particularly during the last twenty-five years, breeding animals have been sold on the Continent of Europe, in Great Britain, and in Canada for shipment to the United States. Not only have breeders themselves bought large numbers of animals abroad, but a class of men has sprung up, especially among horsemen, who make a business of importing breeding animals for sale simply and who rarely import, own, or breed a female. These animals, as a rule, are well-selected; their buyers are keen judges, and the stock of the country is generally benefited by their use. There is no purpose here to cast aspersions on the importer who conducts his business in an intelligent and honest manner; but is not the importing business somewhat anomalous? We have been importing Percheron horses plentifully for thirty years, and never have they come in larger numbers than at present, unless it was in the early days. Shorthorns began to come to the country early in the century; they have not come in steady numbers, it is true, for importations have varied with the activity of the beef-cattle trade, yet we still see Shorthorns imported, and such cattle still hold a prominent place in the show rings. These two instances are sufficient to illustrate the point. We imported in the past and we import at the present. Shall we always be dependent on the breeding farms of Europe? These animals have mainly gone to the breeding farms of the country and should have raised the standard of the breeding stock. One would think the home-bred stock should equal the foreign stock in time, if not, indeed, surpass it.

Not only does the importing method seem to have failed to fix type in many instances, but an idea has gained a foothold concerning the merit of imported animals which is at times almost a positive prejudice against home-bred stock. The man who desires to establish a breeding farm frequently endeavors to get as many imported animals as possible; and, say what we may, the word "imported" still has a charm for the best of us. The power of this word does not rest in the fact that the animal which it designates is superior in individual merit to those bred on native soil. It has acted as a charm—an ignis fatuus—and has clung to foreign animals since improvement began. It is the same delusion which makes us think that something from an adjoining county is better than the same kind of article from our own. It will induce us to pay a round price for an inferior razor if the words "made in Germany" are stamped on the heel. You will find boats on the creeks and rivers of Wisconsin which are made of Oregon pine, and there are boats in Oregon made of Wisconsin oak.

There is undoubtedly a superiority in some classes of the live stock of foreign countries. The consensus of opinion is that in Great Britain the general average is higher and the scrubs fewer in number than in America, but this does not prove that there are conditions in that country which peculiarly fit her for the production of breeding stock above all other countries, and a somewhat lower average here does not prove that conditions in the United States do not favor such production. The quality of foreign-bred animals, the favorable conditions of foreign soils and climate, and the ability of foreign breeders have been so continually held up to our gaze that we have come to regard our own as inferior.

There are other faults in the importing system far more serious than the prejudice which exists in its favor. In our eagerness to get the best productions of foreign breeders we have taken only the results; the methods of the old country have never really gained a foothold in our soil. The men whose names are so often mentioned as those whose efforts established breeds in Great Britain spent their lives with one breed. Not only that, but their fathers before them had begun the work. These men had their own ideals; they were persevering. Twenty, thirty, and fifty years of constant service has repeatedly been recorded in their favor. Yet, with a few brilliant exceptions, the history of stock breeding in this country can point to no such records. Further, American restrictions on breeding methods are much more rigid than those abroad. Fashions in pedigrees have altogether too much weight; color is too important. Col. W. A. Harris has recently said, speaking of Shorthorn breeding:

It is unfortunate that we can not exercise the same liberty of action ourselves which we are perfectly willing to concede to the breeders in Scotland and elsewhere. They breed as they please, so far as pedigrees are concerned, and are judged fairly on the

result of their operations. If the animal produced is satisfactory, there is no criticism whatever made upon the methods pursued or the means adopted to produce the animal. Here we accept without a word of criticism all they produce, and we have no criticism to make upon the means by which they have arrived at the end; but we steadily deny ourselves equal freedom, and we are constantly neglecting and discarding material which is fully as good and which has been among us for years and which we should appreciate strictly according to its merits.

Even in methods of registration we countenance practices abroad which we absolutely prohibit among ourselves. The American Shorthorn Breeders' Association maintains what some have considered a radical position when it restricts the registration of imported animals to those tracing to ancestors recorded in the first twenty volumes of Coates's Herd Book. American breeders are afraid of the cattle from herds which have been built up from native stock and which, under certain conditions, are eligible to registry in the British herd book. This position of the Shorthorn Association is severe, but it is not nearly so unjust as that of associations which do not allow the registration of even a five-top cross in home-bred stock, but are ready to take without question animals recorded in foreign books whose pedigrees are so short that they do not fulfill the requirements of the Government for free entry through the customs. If it is wrong for breeders in this country to breed up from native sources by means of registered sires, it is unfair to allow the registration of a third-cross imported animal which, in addition, has passed the customs free of duty. Either our breeders should be allowed similar privileges or the foreign stock must meet the requirements of the American books for American-bred animals.

That it is possible to improve American breeding stock so that we shall be able to supply our own needs in this respect seems hardly open to question. The country has a foreign trade in meat products and horses to which it is unnecessary to call attention. These products show the possibilities of this country to produce high-class articles, and the question is submitted whether, if we can produce high-grade meat and horses, we can not also produce the breeding animals to supply the sires for our grade herds. The standards of the market animal apply with even more force to the pure-bred breeding animal, and when attributes are given breeding stock which the market does not recognize and which weaken rather than increase prepotency the individual merit of the breeding animal is diminished. The breeding animal himself must be either an individual of much merit, judged by market standards, or he must be able to transmit individual excellence to his offspring. In view of the high standard of most of our market products, can we deny the ability of our breeders to meet these requirements? The thing desired is possible if breeders will apply themselves to the task, and if our State and national authorities will study the problem, and the people lend their support and cooperation.

We can not always draw on foreign countries and obtain high-class animals. Indeed, the rate at which American importers have been buying abroad has caused alarm in those countries for fear that an irreparable loss will be suffered. Of horses, there are in the United Kingdom, in round numbers, 2,022,000 used for agriculture, including unbroken horses and breeding mares; in Belgium, 241,000; in France, 2,926,000; in Germany, 4,195,000. Of cattle, the United Kingdom has 11,376,000; Holland, 1,655,600. Of sheep, the United Kingdom has 30,056,000; France, 19,669,000; Germany, 9,692,000. Of hogs, the United Kingdom has 3,639,000. As only a small proportion of any of these breeds can be used for breeding purposes, the actual number of animals available for exportation to this country is small, especially when undesirable individuals are eliminated. In the United States there are approximately 18,000,000 horses, 67,000,000 cattle, 61,000,000 sheep, and 62,000,000 hogs. Russia only has more horses, and Argentina and Australia more sheep than the United States has, and no country has so many cattle and hogs. In these large numbers we have a positive advantage in the production of breeding animals.

The time is rapidly approaching when the efforts of scientific men must be directed toward the study of the abstract problems of heredity and their practical application to the animal industry. It is a work of great magnitude, in which both the laboratory investigator—the student of pure science—and the animal husbandry worker in the agricultural colleges—the student of applied science—must work in cooperation. One of the first necessities is the equipment of laboratories where breeding experiments can be carried on with the smaller animals which breed rapidly and are highly prolific. These laboratories should have every facility for the utmost freedom of study. They should be supplied with ample funds, and be under the charge of men whose positions are secure and whose ambitions will lead them to make this work a life study. As the results of such investigations might not always be available for the use of the practical stockman by reason of their technical nature, there should be breeding farms in the same localities as these laboratories, and operated in connection with them where the results obtained could be tested with larger animals under field conditions. These farms should be under the charge of men thoroughly trained in animal husbandry, using that phrase in the broader sense. They should be able to go into a strong show ring if necessary and fill creditably the positions of judges; they should know how to breed and feed the kinds of live stock under their care; and should be permitted to keep in touch with the practical side of the industry. At the same time, they should have sufficient scientific knowledge of the subject of animal breeding to enable them to work intelligently and in sympathy with the laboratory investigators. In view of the diversity of soil and climate of the country this work

would have a source of weakness unless the central breeding establishment were in close communication with the different sections of the country where the animal industry is a feature of agriculture. This communication can best be maintained by means of branch breeding farms, operated under the auspices of the central authority or in close cooperation with it. The effects of soil and climate could thus be noted accurately.

No plan of operation would be complete unless it embraced the investigation of herd books and the collection of statistical data showing accurately the breeding records of animals of prominence in the different breeds. It entails, also, cooperation between breeders' associations and investigators, and the organization of county associations of breeders which will have for their purpose the production of results similar to those obtained in Great Britain. The great success of the English system of county breeders, where a sort of mutual consent and mutual liking for the same animals led men to work with the same breeds, is an indication of what may be expected in the United States by systematic and extensive cooperation and well-directed unity of action among neighbors.

Another necessity requires the fullest dissemination of the results accomplished—the discoveries made and principles evolved. The successful plan must of necessity be an educational one. It must show the weakness of present methods as well as their strength, the advantages and disadvantages of the country's facilities, the points to be gained by the concentration of our own blood lines, and the occasion when it may be necessary to go abroad for new blood or for new types.

The keystone of this plan would be American blood, purebred, and recorded by preference, but native if necessary. The best of the blood lines which we have at present, which have been brought from abroad or evolved on our own soil, would be studied, blended, and perfected. It would be folly to restrict the work solely to the use of blood lines or animals to be found within the boundaries of the United States. Rational importing has too firm a foothold on the country and means too much to the live-stock industry to be lightly thrown aside. Under the proposed plan importations would have to be made, and should be encouraged if the animal to be imported was of superlative excellence and its breeding that which would blend well with the best of our own stock. The importation of inferior animals, however, which have been purchased solely with the profit of the importer in view, and may not even be bred as represented and which are sold by highly reprehensible methods, should be discouraged by every means.

A very important and hitherto undeveloped field of work for the promoters of such a plan would be the introduction of new breeds of live stock. There are a great many opportunities in this respect which, if properly utilized, might give the country new breeds of

value. For example, Highland cattle might be tried on the mountain pastures of the Appalachians, where no danger would need to be apprehended to forests, and on the lower slopes of the Rocky Mountains. Some of these cattle have been imported, but there is little information available which can guide the public to a proper estimate of their value under American conditions. A recent importation which attracted considerable attention in the East was one of Welsh Mountain sheep, a very useful breed in its native hills, but never before imported into this country. The animals recently imported show considerable adaptation to their new environment. One of the most promising animals for introduction at present is the milch goat. As is well known, goat's milk is very highly appreciated by physicians for infants and invalids, and the animals are very highly resistant to tuberculosis. Further, the goat is an easy keeper, and those of the European countries yield from 2 to 4 quarts daily during lactation. Under such conditions the development of a breed of deep-milking goats would add a highly desirable product to the milk supply, and would be a boon to the poor of the cities who can not afford to keep a cow, but could keep a goat. The goats now in the United States are not generally desirable for dairy purposes, although some very good work has been done in breeding up from the common goat by selection. The work of developing this industry can be given great impetus by the introduction of the best varieties of Europe. Indeed, an agent representing various private interests has recently been to the Continent to make purchases of milch goats, and others may follow. An animal which has never been introduced into the country extensively, but whose use has been suggested on the Rocky Mountains, is the alpaca of South America.

The introduction of new breeds or species should not be permitted to get into the hands of unscrupulous promoters. When untried animals are introduced they should not be used for general breeding purposes until they are given a thorough test. The public should then know the exact truth concerning them and should be given an accurate estimate of their value, showing their weak and strong points and to what sections of the country they are adapted.

It has been suggested that the Department of Agriculture, through the Bureau of Animal Industry, lead in the work of instituting the systematic and comprehensive study of animal breeding, in cooperation with the State experiment stations and the breeders' associations. How far this may be carried out and the manner of its execution can not be stated at present. During the past year the Department has exercised a closer system than formerly in its work of certifying herd-book associations to the Secretary of the Treasury under the tariff laws, and a systematic plan for the performance of this duty is now under consideration which will go far toward eliminating loose and

questionable practices from the affairs of those associations which may not be conducted honestly and which will not work hardship or offend the self-respect of those whose administration is upright and straightforward, but will be in a sense a guaranty that they are worthy the respect and confidence of the public.

Investigations in animal breeding may properly come under the domain of the Department of Agriculture. The field of nutrition and feeding is influenced more by local conditions. It has been pretty thoroughly covered by the State experiment stations, and does not entail so great an expense as animal breeding. Animal breeding, on the other hand, is apparently more general in its application. It has not yet received much attention from the experiment stations, and to accomplish valuable results it will require resources which few of these institutions can command. If, in the opinion of the leaders in the industry, the time is ripe for such a departure and a feasible plan is formulated, it is possible that in the near future the work of the Bureau of Animal Industry may be enlarged to include investigations in animal breeding.

There is no lack of room for investigators to work. The field is new and it will be sometime before it is crowded. There are opportunities with every kind of stock. The development of the draft horse in the United States, by which American breeders could supply the American demand for stallions, and the development of the heavy-harness horse, the hunter, the polo pony, and the cavalry horse are subjects which interest the horseman. The development of a true dual-purpose cow, the elimination of the scrub in general, and the reason for the numerous representation of foreign herds in our show rings claim the cattleman's attention to the movement for the improvement in animal breeding. Sheepmen are interested in the study of the range conditions. The development of an American bacon which will have a better standing and a higher sale abroad is a matter of importance to hog raisers; and the possibilities in poultry breeding are no less attractive.

Improvement means more, however, than merely supplying the home demand for breeding animals. It defines itself; it means a more economical carcass, more efficient work, greater speed, beauty and general usefulness, and higher prepotency and fertility in our breeding stock. It has a direct influence on the income of the producer, and the welfare of the country at large is reciprocally affected.