99

*Summary of Reports . . .*

# Sheep and Wool Day

*October 28, 1960*





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Dairy and Animal Husbandry Department, Oregon State College, and the Western Oregon Livestock Association.

# FOREWORD

Rapid changes in our agricultural economy create new and complex problems for sheep producers. Concentration of sheep in greater numbers on irrigated pastures or in the feedlot magnify disease and parasite problems. Continued fertilization for maximum yields of forage, selection of breeding stock for peak performance, and forced feeding for increased rate and economy of gain all contribute to an artificial environment far removed from the tranquility of the pastoral heritage of the sheep. The stresses produced by the demands of modern production practices in a successful sheep operation are not understood or fully appreciated. Increasing reports of nutritional deficiencies and imbalances, reproductive failure, and poor livability are indicative of new man-caused problems.

The successful commercial sheepman of the future will wean lamb crops above 150% and average 140 pounds or more of lamb marketed per ewe. He will make full use of the advantages of crossbreeding and he will select and cull his breeding stock primarily on the basis of production records. He will have a disease and parasite prevention schedule rather than a crash treatment program.

His entire management will be designed to market high quality uniform lambs at a set weight and time. He will work more closely with his fellow producers and they in turn with other segments of the livestock and meat industry to do a better job of satisfying consumer preference.

While there may not be complete agreement on some of the opinions expressed, we hope this joint, cooperative effort with the Western Oregon Livestock Association will contribute to the betterment of the sheep and wool industry of Oregon.

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## Contents

# White Muscle Disease Prevention in Lambs

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In the course of research into the problem of white muscle disease in lambs at Oregon State College, it is evident that similar, if not identical, problems exist in many parts of the world. Reports from Canada, Finland, Japan, New Zealand, Russia, Scotland and Sweden testify to existence of dystrophies similar to white muscle in those countries. It is interesting that white muscle disease in this country was reported as a serious economic problem with sheep considerably earlier than it was reported with calves. This may have been due to past practices of feeding better quality legume hays from "improved" or irrigated areas to sheep, while rougher mixed hays were frequently used for cattle. Evidence is accumulating which suggests that "white muscle" is a disease of civilization: occurring in areas where marginal crop lands have been made productive by irrigation and fertilization practices.

Research at this Station mentioned at the 1959 Sheep and Wool Days has shown that white muscle disease in lambs may be prevented by four methods:

1. Including 0.1 part per million of selenium, as sodium selenite, $Na_2SeO_3$, in the diet of the ewe for the last two-thirds of gestation.
2. Including one-quarter pound per head daily of linseed or soybean oil meals in the ewes' diet over the same period.
3. Injecting lambs at birth with 1.40 milligrams of selenium, or
4. Feeding the lambs 2,000 International Units of vitamin E during the first 4 days after birth.

From a practical point of view, method 2, employing the oil meals, is the one of choice at present time, since complete data on residues and tolerances of selenium are not available. Treatment of the ewes during the latter two-thirds of pregnancy with vitamin E was ineffective in preventing white muscle disease in their lambs: either when the vitamin was fed at the rate of 100 I.U. daily, or injected once weekly at the rate of 700 I.U. The effectiveness of selenium and ineffectiveness of vitamin E given prenatally suggests a problem of uterine transfer from the ewe to the unborn lamb. Apparently the large vitamin E molecule is not effectively passed across the placental barrier, but selenium is.

## Selenium-fed lambs heavier

Additional interest in the role of selenium in nutrition has been provided by the observation that lambs from ewes fed the minute dosage of selenium have been significantly heavier at 6 weeks than those from ewes which received the same basal diet without the selenium. Recent trials showed average gains from birth to 6 weeks of 27.15 pounds in lambs from ewes receiving selenium in their feed versus 15.22 pounds for lambs whose dams did not

receive selenium. Lambs which receive selenium by injection at birth gained 20.84 pounds over the same 6-week period, suggesting that part of the effect of selenium, at least, occurs before the lamb is born.

As the picture concerning white muscle disease unfolds, it appears probable that a soil-plant-animal relationship is involved. This means that soils in certain areas may be abnormal, due perhaps to climatic, drainage or fertilization conditions. Because of this, the plants grown on those soils are abnormal and affect the livestock to which they are fed. To date it has not been possible to establish a clear-cut difference in selenium content of forages which do or do not result in white muscle disease. This may mean that other elements are involved creating an imbalance that results in poor utilization. It also means that, as with other trace mineral situations, caution is necessary in application of the research data. Treatments as outlined may give growth responses in certain localities but not in others. Work will continue on the incidence of white muscle and the mechanism of the preventive measure so that they may be applied to best advantage.

## Control of Sheep Parasites

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Over 40 different kinds of internal parasites have been found in sheep raised in the United States. At least 23 of these have been observed in animals from Oregon.

Parasites common to Oregon sheep include one fluke and three tapeworms. The remainder are roundworms (or nematodes). Furthermore, only the liver fluke and six types of roundworms are considered to be serious economic problems. For practical purposes, three major internal parasite problems exist in our state. These involve control and eradication of liver flukes, lungworms, and stomach worms. The last group includes the large or twisted stomach worm (eastern stomach worm) prevalent in the Willamette Valley, the medium stomach worm (brown stomach worm) and the stomach hairworm, both generally distributed throughout the state.

A constant search has been made to find some way of controlling parasites in sheep. This has led to the development, evaluation, and use of a variety of treatments and management practices. Historically, these efforts have centered around the hope for discovery of some substance that could be administered to animals and eliminate all the worms present. After learning that the problem could not be solved in this manner, a new effort was made to achieve control by combining the best drug (anthelmintic) with certain management practices which are based, among other things, on an understanding of the life history of these parasites. Consequently, such ideas as pasture rotation, strategic drenching, stock rotation, treatment of new animals prior to introduction to the flock, and improved nutrition have evolved. It is also interesting to note

that many of these concepts have been put into practice by experienced sheepmen prior to their recognition by research personnel.

The following discussion constitutes a review of current recommendations for controlling those parasites causing the greatest problems in Oregon sheep.

### Liver Fluke

Elimination of the snail involved in the life cycle is still the best procedure for controlling this parasite. Since snails live in wet marshy areas and in weedy irrigation ditches, it would be best to keep sheep out of such places by fencing. Proper drainage would make it possible for some areas to be turned into suitable pastures. Likewise, irrigation ditches cleared of overhanging vegetation become unsuitable for further snail development. Farm ponds can be made safe by the use of fences and by providing centralized watering centers such as tanks or troughs.

Snails may be killed with copper sulfate (bluestone). This material can be applied in several ways. But other forms of aquatic animal life, such as fish, will be affected. Over-use also may result in copper poisoning in sheep. Correct recommendations advocate a 0.5% solution sprayed on marshy pastures during the snail season—late winter, spring, and early summer. Animals must be kept out of the area for several days after treatment or until a rain has occurred. Irrigation ditches can be cleared by placing a bag containing copper sulfate at the head of the current. For ponds, 1 part of copper sulfate to 1,000,000 parts of water will kill all snails within 24 hours.

Parasitized animals will probably show signs of infestation during the period when immature flukes are penetrating the liver. Ordinarily neither carbon tetrachloride nor hexachlorethane will be effective during this stage, although both chemicals have been shown to be quite effective against the adult stage. If a drug has to be used, the best time for treatment is when adult flukes are in the animals. In this manner, four results may be accomplished: 1) flukes will be killed, 2) further liver damage will be stopped, 3) fluke egg production will be interrupted, and 4) snail infection will be reduced. There is no specific season when immature or adult flukes will be present. However, we believe that early winter treatment with carbon tetrachloride (1 cc. gelatin capsule administered orally, repeated in 10-14 days) gives the best results.

Conditions favorable to new infestation should always be considered in administering treatment. These include: 1) presence of water necessary for snail deveolpment, 2) warming up of the weather, 3) presence of mature flukes capable of laying large numbers of eggs, and 4) increased grazing activity.

In conclusion, always remember that a greater control over this parasite can be achieved by preventive treatment than by treating animals after they begin to show symptoms of liver fluke infestation.

### Lungworms

Three species of lungworms have been reported from sheep in the United States. One of these, the thread lungworm, is responsible for most of the problems in Oregon. This parasite causes irritation to the lungs and in severe infestations can account for heavy economic losses. The larvae are passed in the manure and then migrate onto plants. Grazing sheep eat these

and become infested. The free living larvae are reported to be susceptible to drying or low temperatures. The period of highest incidence for reinfestation or primary infestation is in the spring. It is common to observe certain animals showing signs of immunity to this parasite. Also, it is known that lambs under six months of age do not acquire serious infestation, unless deprived of their milk supply.

To control this parasite, a combination of management practices should be followed. Treat animals from areas where lungworm problems have been reported before conditions become favorable for larval survival. This means early spring in Oregon. Treatment at this time is extremely important as it tends to prevent buildup of parasites on pastures. Dictycide is the drug to use, and is administered at the rate of 1 cc. per 35 pounds body weight and not to exceed 4 cc. in any single animal. This treatment should be repeated since the drug is not effective against the immature parasites. A period of 14 days between treatments is usually recommended. In addition, new animals should be treated with Dictycide before introducing them into the flock. This practice is particularly essential if they come from a lungworm infested flock or area. Dictycide is produced by Fort Dodge Laboratories, Fort Dodge, Iowa, and may be obtained from any veterinarian.

Pasture rotation at two to three week intervals (or as often as is practical) may aid in control, since this practice helps reduce buildup of infective larvae. This is especially important in regard to irrigated pastures. Overgrazing or overstocking of a pasture results in buildup of populations of all types of parasitic nematodes.

**Roundworms of the digestive tract**

Sheep usually acquire infestations of these parasites shortly after weaning. The infective larvae hatch from eggs passed with manure. These eggs then migrate onto vegetation and are eventually eaten by grazing animals. Infective larvae are susceptible to drying or low temperatures and consequently the spring season is the best time for their survival. Some larvae of most species are capable of overwintering on pastures and are available to infect grazing animals regardless of pasture rotation practices.

Probably the greatest problem resulting from these parasites is reduced production efficiency occurring from widespread moderate infestations. Occasionally, individual animals will die from anemia or other complications caused by the parasites and in some instances a high percentage of animals may be lost.

The principle of control is centered on preventing the development of a high level of infestation in flocks. This may be achieved through the combination of several management practices. Pastures should not be overstocked. Also, through pasture rotation the number of immature parasites will be naturally reduced as a result of exposure to various climatic effects (heat, drying, freezing). A high level of nutrition should be maintained since this helps to ensure resistance. Finally, worm egg production should be reduced by drug treatment before large quantities of eggs have been passed onto the pasture. Failure to follow any of these practices may result in heavy lamb infestations.

Phenothiazine is the drug to use. It should be given in the fall, spring and in some instances during midsummer. Drenching is the most con-

venient method of medication. Since phenothiazine is not effective against immature parasites, a second treatment should be given 10-14 days following the first. Fall drenching aids in the elimination of parasites acquired during the summer which otherwise would be carried over winter. Spring drenching will help check a buildup of worms occurring at that time. If ewes are treated according to these recommendations there is a possibility that lamb treatment can be eliminated, although this point must be further investigated before a general recommendation can be made. Recently, a new type of phenothiazine (Purified Fine Particle Phenothiazine) has appeared on the market. Tests at the Oregon Agricultural Experiment Station and the University of California Experiment Station have indicated that this material is more effective in controlling roundworms in sheep than the standard fine particle material. Further data regarding the results of these studies will be released as that information becomes available.

## Chain Store Requirements in Buying Lamb

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There is a market for every type of lamb. However, except for the top grade of lamb, price per pound determines the volume that may be sold. For the grower who is looking for the top market price for his lambs, specifications that most buyers of top grade lambs look for and demand when buying lambs are presented.

A lamb should weigh between 45 and 50 pounds dressed (this would be a lamb that weighs 90 to 100 pounds shorn or 95 to 105 pounds in the wool). This lamb must have smooth blocky conformation with fairly short legs. This lamb must have been fed the quality of feed so that it has a firm, smooth, but not heavy, fat cover over its body and kidneys. The meat must be light red to pink in color and show a light feathering of marble in the flank and between the ribs. There should be a showing of blood in the rib bone structure, and fore shank ends should show unformed bone with no hard surface. There are lambs, of course, that weigh more or less than this specification that are very desirable; but they are usually discounted slightly from the top market price because they are not as easy to cut and merchandise as top lambs. Most of the balance of the lambs that come to market are sold through markets selling lower quality meats on a price competitive basis of how low it can be sold.

Lamb is wonderful meat—a meat with a wide-open future. This future is not one that will come easy, but only through the cooperation of the grower, meat packer, and meat retailer.

For many years lamb was a secondary crop of the wool growers. It was not available all year long and had gained an unsavory reputation (not justified) about its flavor. While some strides have been made in the promotion and sale of lamb, it still makes up only 4½% of our total

consumption. I would venture to say without statistics there are 100,000,000 people in the United States that have never tasted lamb. There are less than 25% of the families that have lamb on their menu twice a month, so you see we have a big field in which to work.

The work of the American Sheep Producers Council has made good progress in lamb promotion. However, in any promotional idea, some things are effective and some are not. Each year the council is bringing before the public more information about the fine meat that lamb really is, its value to the average American family in adding variety to the menu, and in furnishing protein of importance in daily living.

Do not underestimate the importance of the meat retailer in the marketing of lamb to the ultimate consumer, the American public. He is the sales organization that presents this product that you have so carefully raised for market. It is regrettable that for many years, 50% of the meat markets did not stock lamb, and 25% more stocked it only on occasion. Recently, better meat merchandizers are realizing the value of lamb and the extra meat items that it gives them for variety in their selling program. If you, as lamb producers, continue to raise and feed the kind of lambs the retailer can sell best, I sincerely believe we will see a continued upswing in lamb sales. Always remember that your product is placed on a highly competitive market, and must compete in quality and selling price with many other meat products. I am sure that a meeting such as you are having here at Oregon State College, which is aimed at pooling your knowledge on methods of breeding and feeding lambs, will aid materially in producing lambs which can compete on the present-day market.

If the majority of your lambs are produced along the specifications set forth earlier, I am sure the retailer will find an expanding market for lamb. We have a great potential market in people that do not presently use lamb and working together, we can conquer part of this market.

Under pressure, our USDA Grading Standards for lamb were relaxed, but now it has swung too far the other way. What the lamb retailer wants is a grading standard between these two points, and if we get it on a continued basis, we will sell more and more and more lambs.

## Handling and Marketing of Valley Wools

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The term "Valley Wool" has become more of a description of type rather than representing wool from a specific section. Originally, "valley wools" were known as wools from the Willamette Valley, Oregon. Today, that "valley" has grown to encompass the vast country West of the Cascade Range in Oregon and Washington.

These wools are all similar in color and condition, excepting possibly the Curry County wools which are much lower in grade and usually somewhat lighter in condition. Some of the Coast

wools also tend to be a little white in color. The longer or staple valley wools are desirable for spinners who specialize in bulky and springy yarns such as knitting yarns and sweater stock. Woolen mills can use the shorter wools for blankets, meltons, and other fabrics that do not require a smooth finish. Paper maker felt manufacturers normally use strictly staple wools, five inches and longer, and lower grade wools such as quarter-bloods, low quarter-bloods, commons, and braids. These wools must be exceptionally strong and must not contain any tender fleeces.

Although we grade out a small percentage of these types from our general run of valley wools the big weight of paper maker felt types are graded out of the Curry County wools. The felting quality of the valley wools is attractive to the felt trade. Moisture loss, wools damaged by being packed while damp, and excessive tags are probably the most hazardous element in buying valley wools. A wet spring such as we experienced this year caused considerable grief to people who handled valley wools. One line of valley which we graded in early August showed us a weight loss of 2.6% from our receiving weights in May and in shipping two cars of this line to the east coast showed an additional loss of .98% and 1.3% respectively. This moisture loss alone cost almost two cents per pound, not considering tags and other off wool found in the bags.

**Marketing**

Northwest wools are generally marketed through several channels such as direct mill buying, country buyers representing large concerns, grower-marketing cooperatives, speculators and in some instances pool sales. Probably the largest weight is sold through the country buyers representing larger wool merchants. This is our method of buying the valley fleeces. We certainly do not say that this is the best method or even a good method of buying wool from either the standpoint of the grower or the buyer. We normally have about 35 agents buying wool for us in the valley and 10 representatives buying ranch or farm wools for our account east of the mountains in Oregon, Washington and Idaho. Unfortunately, very few of these buyers have any knowledge of wool and we must buy on set prices. This means that we must take the bad with the good and hope for the best. Competition forces us to operate in this manner.

Possibly a more ideal method would be similar to the way some sections of the Midwest market their wools. A competent buyer is sent out to a certain district after the growers have been advised by mail and advertising, that the buyer will be receiving wool on a specified date. As the growers bring their wool in, the buyer would carefully examine each clip and in some cases rough grade the wool for various grades and values. The grower with the well cared for and well put up clip would receive premium prices whereas the grower with the poor lot that is taggy, trashy, and shows that neither the sheep nor wool have had proper care would be offered the actual value of the wool, several cents below the premium prices. He would no doubt try to sell his wool elsewhere. By this method the producers would still receive cash at the time of shearing.

It seems to be a natural tendency for a grower to want to sell his wool at shearing time. I have been told by growers, especially large range operators, that they have done better on 10

year averages by selling at shearing time, than by holding the clip for the so-called fall market. This fall market has failed to materialize to any substantial degree for several years.

A sealed bid sale is usually a good method to market large accumulations, provided that you have a very large and clear crystal ball to help choose a proper date to hold the sale, which must be advertised to buyers all over the country, weeks in advance. We have found that the best time to sell wool is when someone wants it.

In some areas pools have been fairly successful; there again, you need that clear crystal ball, as you have the problem of choosing the proper sales date. Also, pools do not improve marketing methods because the grower with a choice lot of wool must be averaged down to help sell the poor and inferior clips in the pool.

### Importation of yarns demoralizing

One of the most demoralizing factors affecting all segments of the woolen industry is the importation of yarns—piece goods, and foreign top from abroad. Although we have some tariff protection on these imports, radical improvement is needed on our trade policies to slow imports from the low wage countries. Some foreign mills can manufacture goods made of shoddy and junk so cheap that the tariff does not particulary bother them on this class of goods. Even the better high quality fabrics can be imported into the United States much cheaper than the American manufacturer can produce them because of the great difference in labor costs. These imports increased some 20% in the first six months of this year over the same period of 1959. In 1959 some 44 million pounds of these products came into this country which is equivalent to over 80 million pounds of your grease wool. This is one of the reasons that over 200 woolen and worsted mills in the country have gone out of business since 1946. By working with the National Wool Growers Association, the various farm and grower organizations, along with local business associations, should do everything possible to improve this situation since these imports can only be reduced by congressional legislation. We must certainly keep in mind that the only market for American wool is the American manufacturer and when they are hurt through these imports, the wool grower suffers.

## The Oregon Sheep Production Testing Program

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The Oregon sheep production testing program is set up to assist sheepmen with selection of ewes and rams that will produce more pounds of lamb and wool. In this program, considerations are given to milk production, twinning, gaining ability, and wool production.

A selection index which incorporates these characteristics is used as a method of estimating the merit of each ewe. This index provides a single

figure by which all ewes in a flock can be compared.

This program is especially helpful to the purebred breeder, but he cannot base his selection on records alone. He must consider these production records along with breed type and conformation.

Production records for the commercial producer aid greatly in selecting the top producers and in culling the poorer producers.

### Identify each ewe

In beginning a production testing program, each ewe must be identified with her offspring. To accomplish this, each animal can be ear tagged with a numbered metal or plastic tag.

Birth date of lambs may be recorded on a chart or in a small pocket type barn book. Also, type of birth (single or twin) and sex of lambs should be recorded. Birth weights are not used in this index, but a producer may desire to record them for his own information.

Fleece weights can be recorded on the same chart. The weight of the wool multiplied by three gives the wool figure to be used in the index.

Lamb production is measured by obtaining adjusted weaning weights at 120 days of age. It is not necessary to weigh each lamb at exactly 120 days of age. Lambs can be weighed between 90 and 140 days of age and adjusted to 120 days. This gives a 50-day spread in age of the lambs so one weighing should be enough.

Ewes having twins or triplets receive additional credit. To the average actual weight of lambs weaned, add 21 points if the ewe weans twins. Only six points are added to ewes dropping twins but raising only a single.

To place all lambs on a comparable basis, credit ewe and wether lambs with four additional points but no additional credit if a ram lamb. This adjusts for sex differences.

An additional three points per lamb are credited to ewes lambing for the first time as a two-year old or younger. Ewes seven years or older are credited with three additional points per lamb.

This is how the index is computed. For example, a two-year old ewe lambing for the first time raised twins (ram and ewe) that weigh 96 and 88 pounds respectively at 120 days, and she shears 10 pound of wool:

| | | |
|---|---|---|
| 92 | points | Average weight of twin lambs (96# and 88#) |
| 21 | " | Raised twins |
| 4 | " | One twin is ewe lamb |
| 6 | " | Ewe is two years old |
| 30 | " | Wool credit (10 lbs. x 3) |
| 152 | points | Ewe Index |

### Transfer information

The information should be transferred to a permanent ewe record card. These cards are available from Extension Service, Oregon State College at 1-cent per card.

These records are a valuable tool for the flock owner who is interested in producing more pounds of lamb and wool.

Additional assistance may be obtained through the County Extension Office.

# Results of OSC Sheep Breeding Research

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The Department of Dairy & Animal Husbandry in cooperation with the Eastern Oregon Branch Experiment Station of Union, Oregon, are actively engaged in three sheep breeding studies. The one to be reported here concerns genetic studies to determine the inheritance of various production and carcass traits in sheep. We hope to determine from this research an accurate method of selection combined with a breeding system that will improve the efficiency of lamb production as well as certain carcass characteristics. Breeds of sheep involved are purebred Columbia and Targhee ewes at the Union Station and Hampshires here at the Central Station. Three separate lines within the Hampshire flock have been established. Yearly, two ram lambs from each line are selected for progeny testing on the Columbia and Targhee ewes. The selection of ram lambs is based on 1) heavy weaning weight, 2) gain and efficiency of feed used on performance test, 3) conformation score at weaning, and 4) freedom from inherited abnormalities.

Progeny testing two ram lambs from each line and slaughtering their crossbred offspring at weaning age makes it possible to obtain considerable carcass information regarding each sire group. Rather than slaughter all crossbred lambs at weaning, four ewe lambs from each sire are selected for future genetic studies.

The individual performance of four rams that were progeny tested in 1959 is given in Table 1. Also conformation can be observed from each of their photographs.

The results from Table 1 indicate that the lambs in line H made faster gains on test and as a line, were more efficient in their feed utilization than those from line O. It is known that the more rapidly gaining rams or bulls are more efficient. The average weight of the ram lambs off performance test was 176 and 155 pounds respectively

**Table 1. Individual Performance of 1959 Ram Lambs from Lines H and O.**

| Line | H | | O | |
|---|---|---|---|---|
| Sire number | B-3 | B-33 | B-7 | B-9 |
| 120 day adjusted weight, lbs. | 80.2 | 106.2 | 102.0 | 101.6 |
| Gain on performance test, lbs.[1] | 65 | 62 | 49 | 44 |
| Performance index | 77.2 | 97.4 | 90.4 | 90.1 |
| Feed efficiency per line, lbs.[2] | 6.44 | | | 6.92 |

[1] Performance test period 55 days immediately following weaning.
[2] Pounds of feed consumed to produce one pound of gain for all ram lambs in each respective line.

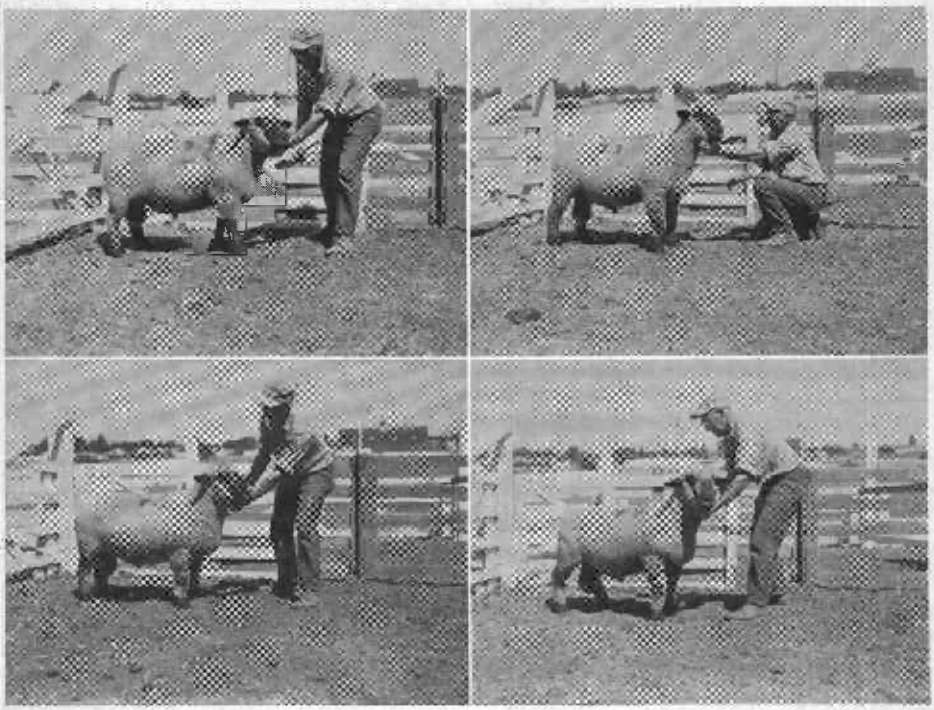

**Fig. 1. Conformation of four rams on test can be noted above. Top photos: B-3 (left), B-33; Bottom photos: B-7 (left), B-9.**

for lines H and O. The lamb with the highest performance index in line H died, necessitating using B-3 as a replacement.

The crossbred progeny from the four sire groups were weaned in June 1960, and immediately sent to slaughter, except four ewe lambs from each sire. Some production and carcass measurements for each progeny group are presented in Table 2.

From Table 2, several items need to be discussed. The weaning weights for each sire group have not been adjusted for age of lamb, type of birth, sex of lamb, and age of dam. The age of lambs vary ten days between sire groups and the type of birth will influence weaning weights considerably. Most research workers agree that milking ability of the dam is of major importance in determining weaning weights. This item is of considerable importance when trying to evaluate sire performance within a breed and especially when the sires were selected because they possessed outstanding performance records. The data pertaining to carcass traits were obtained on only four carcasses per sire. Evidence indicates that the longer carcasses yielded a slightly higher dressing percentage with more rack and loin than the shorter carcasses. Other data from this station indicate the same trend within other breeds tested.

For the taste panel scores on aroma, juiciness, texture, flavor of fat, flavor of lean, tenderness and over-all scores, no major differences could be detected

**Table 2. Average value for weight and carcass traits of crossbred lambs from four sire groups.**

| Sire number | B-3 | B-33 | B-7 | B-9 |
|---|---|---|---|---|
| Number and sex of lambs (female) | 6 | 7 | 5 | 8 |
| (wether) | 5 | 8 | 4 | 6 |
| Weaning weight, lbs. | 98 | 93 | 91 | 96 |
| Age of lambs at weaning, days | 149 | 139 | 145 | 145 |
| Carcass grade[1] | 4.3 | 3.8 | 4.0 | 4.2 |
| Carcass yield, % | 45.0 | 49.4 | 46.5 | 48.7 |
| Loin, %[2] | 11.7 | 12.3 | 11.1 | 12.4 |
| Rack, % | 10.6 | 11.4 | 11.7 | 11.0 |
| Shoulder and neck, %[2] | 27.1 | 27.0 | 28.0 | 27.3 |
| Carcass length, inches[3] | 23.5 | 24.2 | 23.3 | 24.7 |
| Loin-eye area, sq. inches | 2.27 | 2.26 | 2.13 | 2.23 |
| Eating quality score[4] | 4.9 | 5.1 | 5.7 | 4.8 |
| Tenderness score[4] | 5.3 | 5.1 | 5.8 | 4.9 |

[1] Prime, 5; Choice, 4; Good, 3; Utility, 2.
[2] Based on cold carcass weight.
[3] Front of first rib to aitch bone.
[4] The higher the score the more desirable the cooked meat as scored by a taste panel.

between progeny from the four sires. However, all lambs were under five months of age and milk-fat when slaughtered. In addition the loin-eye, which is the most tender piece of meat, was used on all taste panel work. For size of loin-eye area, there is more variation within sire offspring than between sire groups. This should not discourage sheep breeders because some carcasses with loin-eye measurements are twice as large as others, and it is only a matter of time until we will be able to identify those animals possessing a large eye muscle while still alive and make major use of them in our breeding programs. It should be of interest to every sheepman that, based on 100 pounds of carcass weight, these crossbred lambs have 4.5 square inches of loin-eye area while some standards for beef and meat-type hogs are 2 and 3 square inches respectively per 100 pounds of carcass weight. The largest loin-eye measured here at Oregon State College was 2.90 square inches from a Hampshire ram lamb at 137 days of age.

As mentioned earlier, immediately after weaning four crossbred ewe lambs from each progeny group were sent to Corvallis for determination of future performance. Results on performance testing of these crossbred ewe lambs are presented in Table 3.

Results from Table 3 indicate that the lambs from B-3 and B-33 of line H gained slightly faster and had a mean advantage in feed efficiency of .36 pounds. Although this difference between lines is not great, it still represents a difference in feed efficiency of 5%. Between groups B-33 and B-9 there was a 14% difference in favor of the lambs from B-33. Such differences would be of economic advantage in a lamb feeding operation.

**Table 3. Average values for performance traits of crossbred ewe lambs from four sires.**

| Sire number | B-3 | B-33 | B-7 | B-9 |
|---|---|---|---|---|
| Weight on test, lbs. | 104 | 103 | 94 | 106 |
| Age on test, days | 146 | 145 | 139 | 145 |
| Gain on test, lbs.[1] | 33 | 34 | 31 | 30 |
| Feed efficiency, lbs.[3] | 7.15 | 6.82 | 6.94 | 7.75 |

[1]42-day test period.
[2] Pounds of feed consumed to produce one pound of gain.

The individual performance records on four ram lambs that were selected for progeny testing during the 1960 breeding season for mating to Columbia and Targhee ewes at the Union Station are presented in Table 4.

The 1960 ram lambs were heavier at 120 days of age and made faster gains than the 1959 ram lambs. The heavier weaning weights in 1960 were probably in part due to use of legume pastures during lactation. The better gains on performance test could be due to differences in the quality of the test rations in 1959 and 1960.

### New phases of research on crossbreeding

Several new phases of research were initiated in 1960. Future results from these projects will be of considerable interest to all sheepmen.

Phase I. Breeding of ewe lambs to determine their lamb production from Southdown or North Country Cheviot sires.

Phase II. Lamb production from crossbred ewe lambs (see Table 3) compared to production from purebred Hampshire ewe lambs when both kinds of ewe lambs are bred to a North Country Cheviot or Southdown ram.

Phase III. Carcass and taste panel evaluation on progeny produced under phases I and II.

Phase IV. Determine lamb production from crossbred ewe lambs which are of a Romney ewe by Dorset Horn cross.

Phase V. Determine the accuracy of predicting future lamb production of a ewe from the individual performance record made as a ewe lamb.

**Table 4. Individual Performance of 1960 Ram Lambs from Line H.**

| Ear tag number | C-13 | C-15 | C-17 | C-61 |
|---|---|---|---|---|
| Adjusted weaning weight, lbs.[1] | 110 | 110 | 99 | 112 |
| Gain on performance test, lbs.[2] | 62 | 62 | 66 | 65 |
| Performance index | 100.4 | 100.4 | 103.6 | 103.0 |
| Feed efficiency, lbs.[2] | 6.16 | 6.16 | 5.93 | 5.70 |

[1] 120 days of age.
[2] 55 days test period immediately following weaning.
[3] Pounds of feed consumed to produce one pound of gain.

# Ram Care at Breeding Season

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If possible, obtain rams at least 2 months before the breeding season. If an animal is too fat, he can be reduced gradually on a good pasture where he will get plenty of exercise and a ration conducive to good fertility.

If, on the other hand, the animal is too thin, he can be increased in condition by grain feeding. This may be done with 1- or 1½-pounds of whole grain plus some protein supplement such as cottonseed meal or soybean meal. Alfalfa hay may be used to supply the protein if it is available on the ranch.

If it is necessary to purchase a ram in high condition immediately preceeding the breeding season, it is better to maintain him in this condition throughout breeding, because too rapid reduction may impair fertility.

All rams carrying long wool should be sheared prior to breeding season since the body temperature of a ram is quite closely related to fertility. Many of the rams that are used the year of purchase will carry considerably more wool than the carry-over rams, but in either instance it is advisable to shear them.

Parasites, internal and external, are another problem that confronts the sheepman. A discussion of internal parasites generally centers around use of phenothiazine. The latest information obtained indicates that use of purified phenothiazine seems to do the best job of removing worms from sheep.

Another point to consider here is sheep ticks. Deldrin dust is the best method we have at the present time in eliminating this parasite. Removing ticks from the ewe flock without removing them from the rams will not produce a tick-free flock.

Another important point to consider is the condition of the ram's feet. We may see animals with feet that are neglected and in a horrible condition. In some instances bad feet will seriously impair the breeding usefulness of the ram. The outside shell of the hoof will normally grow faster than any other area and will wear down more slowly. This is particularly so if the sheep have been on soft ground. Hoof trimming may be done with a number of tools. Care must be used to control the cutting edge of a pocket knife. Also, a farmer could be injured by the sharp knife if the ram kicks while the foot is being trimmed. Pruning shears are useful tools for hoof trimming.

Dr. Wu will discuss fertility testing of rams. I might point out that in the demonstrations conducted around the valley, approximately 10% of the rams tested have been found infertile.

The number of rams needed per 100 ewes is a subject of great discussion. The number will depend upon the type of area that the ewes are grazing. If the ewes are in rough country, it may be necessary to go as high as 3.5 rams per 100 ewes. In farm flocks, only two rams per 100 may be sufficient. The general recommendation on most flocks of sheep is three mature rams per 100 ewes.

Some other points that will tend to increase lambing percentage might be mentioned. During the breeding sea-

son the weather may be extremely hot; therefore, it is advisable to turn rams with the ewes during the night only, as the majority of breeding takes place at night. Rams can be kept in a cool area during the heat of the day which keeps up their fertility. There is some additional work in pulling the rams out in the morning. However, with a bit of training, the ram will learn to come to feed when the bucket is rattled and this problem will not be serious. Rams should be put in the coolest place possible and given extra feed. A clean barn with good ventilation will take care of the situation, as far as temperature is concerned and will also help keep down the irritation to the ram from flies.

Some authorities advise use of alternate groups of rams in which some rams are left with the flock for three or four days and then pulled out and a fresh group of rams are turned in with the ewes.

Some examples of good sheep husbandry might be pointed out in the use of confined breeding—where ewes are put into a small pasture or dry lot during the night and are turned out to pasture in the morning. This will give the ram an opportunity to check the ewes in the flock more easily and quickly rather than having to travel over a mountain side to check those ewes that might be in heat.

A method of marking the ewes as they are bred should be used. One of the most frequently used methods is the soft crayon which is held on the ram's brisket by a harness. The other method is to paint the brisket with a mixture of raw linseed oil and ocher of various colors. Either of these methods will work. It must be remembered that in either method, lighter colors need to be used during the first part of the breeding season and changed to a darker color at 14-day intervals. If the oil treatment is used, it needs to be replenished every 2 or 3 days.

## Semen Testing of Rams for Predicting Fertility

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Checking semen quality for stud rams before they are used for breeding is of extreme value to sheep producers. This is particularly true for small flocks where the lamb crop may depend entirely on the fertility of a single ram. We have heard reports of total barrenness in some one-ram flocks where the stud ram used was infertile. Financial losses in these cases, estimated at $20 per lamb, could be considerable. It is indeed a risky procedure to use a ram for breeding without knowing whether or not he has the ability to produce semen of good quality.

The general reluctance on the part of sheep producers to test the semen of their rams may be partially due to the misconception that sexual drive, general aggressiveness, or even body size and conformation of the ram are of value in predicting fertility. Since the role of sperm cells in the process of fertilization was discovered, there is no doubt that semen quality is the

most reliable index for assessing male fertility.

Another reason why semen testing is scarcely used in stud rams may be due to an under-estimation of the incidence of infertility in rams. Research data, however, indicate that in rams the incidence of infertility is about 10-15%, or even higher. Webster, of New Zealand, from his data collected over a period of 12 years, reports that about 10% of all rams are sterile, and an additional 15% are of doubtful fertility. In the study of semen production, the U. S. Sheep Experiment Station, Dubois, Idaho, found that 14% of 134 yearling rams tested produced semen of borderline or definitely poor quality and another 6% refused to serve. Of the 61 ram lambs they tested, 30 refused to serve, and 6 of the remaining 31 ram lambs produced semen of inferior quality. These data clearly illustrate the potential presence of "duds" in many flocks. To get high lambing percentages these "duds" must be eliminated. Such infertile rams waste feed and labor. Should they be the so-called "boss ram," they are preventing fertile rams from serving the ewes.

**Semen test for infertile rams**

The best method of locating infertile rams is by semen testing which can be done by a veterinarian shortly before the breeding season. The semen can be collected by an electro-ejaculator. During collection, the probe of the ejaculator is inserted into the rectum of the ram and along the probe proper electrical stimulations are passed. In response to the stimulations the ram ejaculates. This electrical method is not severe to the ram; neither will it affect semen quality. The semen so collected will be subjected to tests for quality, such as the color and concentration of semen and the motility of the sperm cells. Or, if it is necessary, the examination may include some other tests such as the morphology of spermatozoa, the percent of live and dead sperm cells, and an inspection for the presence of microorganisms or pathological material in the semen.

**Remove infertile rams**

As mentioned previously, semen testing is very reliable for predicting male fertility; therefore, rams that are proved to be infertile by the test should be eliminated. However, the disposal of those that prove low in fertility will depend largely upon their genetic worth as breeding stock. If they are highly valuable sires they could be kept for further observations.

In conclusion we are firmly convinced that:

1. Because of the fairly high incidence (10-15%) of testicular failure is rams, it is a risky procedure to use a ram for breeding without knowing whether or not he has the ability of producing good semen.

2. To avoid the use of infertile rams in the flock, semen quality of stud rams should be checked by a veterinarian shortly before the breeding season.

3. Body size and conformation, general aggressiveness, and sexual drive are not reliable indices for predicting fertility. Fertile rams usually do have good sexual drive but rams with good sexual drive are not necessarily fertile.

# Lamb and Mutton Imports—Their Effect upon the Sheep Industry

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The sheep industry is in trouble. In such a situation, the industry is looking at every factor which may have a bearing on the long-run competitive picture of the sheep producer. One of the factors drawing considerable current interest is the level of lamb and mutton imports into the United States.

This situation reached a climax in March of this year when the National Association of Wool Growers, and allied associations, sought to have the United States Tariff Commission raise import duties or establish quotas on lamb and mutton imports into the United States. Dr. S. K. Christensen, formerly a staff member of Oregon State College and now Agricultural Economist and Counsel of the National Associations of Food Chains in Washington, and I were asked to make an economic study of the lamb and mutton import situation. My remarks today are based largely upon this report.

## The import situation—some bearing points

Before 1958, lamb and mutton imports were of minor consequence in the United States. In 1951 only 7 million pounds were imported, accounting for about 1.3% of our domestic production. Since 1958, however, imports of lamb and mutton have been increasing at a phenomenal rate. Using the 1951-55 import level as a base period, lamb had increased 100% by 1958 and mutton by 2,400%. By last year, lamb imports had increased 179% from the base period while mutton imports had gone to 6,000% of the base period.

In 1959 approximately 9.5 million pounds of lamb were imported into the United States. About one-third of this amount came from Australia; one-third came from New Zealand; and a little less than one-third from Iceland. As compared to 1958 this was a ten-fold increase in imports from Australia and a three-fold increase in imports from Iceland. Most of the mutton came from Australia, with about one-fifth of it coming from New Zealand. The problem has been further accentuated recently by the increased importation of live lambs and sheep. In 1957 we imported into this country 17,800 head. By 1958 imports had increased to 40,000 head, and by 1959 it was estimated that 76,000 head had been imported into the United States. A large share of these imports came through the ports of California. Lamb and mutton imports amounted to 10% of the United States production last year.

## What triggered the problem?

A number of factors contributed to the increase of lamb and mutton imports into the United States in recent years. One of the principal factors was the deterioration of lamb prices in the United Kingdom in 1959. Prices declined in England because of an increased domestic slaughter of lamb in the U. K., and also because of an increased supply of other red meats—estimated to be up 24 percent from the 1951-55 production level. This situation was further complicated by an increase in production in both New Zealand and Australia. This was the

year which saw a cancellation of the trade agreement between Australia and the United Kingdom which had traditionally tied these two areas together. With exports from New Zealand and Australia largely on a "free market," shippers were free to send them where they would possibly attract the highest prices.

Exports of lamb to the United Kingdom during 1951-55 amounted to 85.6 million pounds. By last year, 1959, these exports had declined to 74.8 million pounds. On the other hand, exports to the United States during 1951-55 amounted to only .7 million pounds. During the period July 1958 to March 1959 exports to the United States had increased to 2.2 million pounds.

Another factor in the domestic import problem is the rather violent fluctuation in the seasonality of lamb imports. In 1957, for example, imports reached their peak in March. In 1958-59, peak imports occurred in April; again in June; and again in August. In two of these periods peak imports occurred at the time that our domestic lamb marketings were also at a peak. This fact served to depress prices in the United States. Moreover, imports are handled largely through meat wholesalers rather than packers. There is some indication that meat wholesalers do not hold imported lamb for any period of time, thus complicating normal orderly marketing procedures.

**The impact upon the domestic industry**

Lamb prices finished the year 1959 from $1.00 to $3.00 under 1958 prices. This price decline was not due to increased lamb imports alone. Domestic production of lamb also increased last year, so increased domestic slaughter plus imports contributed to the weaker price level in the lamb market.

An effort was made to determine the effect of the increased lamb imports in 1959 upon our domestic sheep industry. Using the best data available, it is our judgments that increased lamb imports in 1959 cost U. S. producers a little over $9 million in income. In other words, our domestic production of lamb last year would have brought slightly more than $9 million additional to the sheep industry had imports not reached the level that they did.

An important factor which is often overlooked when appraising the impact of frozen lamb is the fact that much foreign lamb is discounted at prices 15% to 20% under domestic lamb prices. This has the effect, therefore, of undermining the strength of domestic lamb prices during any marketing period.

A special effort was made to survey the impact of frozen lamb in a number of our major cities. Special attention was given to the large markets in New York City, Boston and in Washington, D. C. It was observed in this survey that frozen lamb is directly competitive with domestic lamb. During this survey I had the opportunity to visit one of the large supermarkets in the greater metropolitan New York City area where I observed frozen lamb and fresh lamb side by side in the same refrigerated meat case. All of the buyers with whom I visited indicated that frozen lamb was attractive to them at prices 10 cents a pound or more under the domestic lamb price.

Throughout all the cities visited by Dr. Christensen and me, we were assured without exception that the quality of New Zealand lamb is excellent. Generally the carcass has less fat and a better trim. Moreover, the lamb carcass is in a weight range which makes it attractive to consumers. In every

city visited it was observed that the interest in frozen lamb was growing. In Boston, for example, the Greek trade buys large quantities of lamb. Because of the price factor, several markets in the area started using frozen lamb. At first there was a resistance to frozen lamb. It was not long, however, until the Greeks found that it was a good quality product at an attractive price. It is expected that a larger share of the sales to the Greek trade in the Boston area will be frozen lamb if supplies are available and if the price stays 10 cents a pound or more below domestic prices.

There is also a growing interest in the hotel, restaurant and institutional trade to purchase frozen lamb over domestic lamb. This trade tends to discount the frozen product less as compared to the fresh product because most of it is held frozen until used. In store after store that we visited we observed frozen lamb being sold in increasing quantities. In one store we saw both frozen and fresh cuts of lamb at the same price. In addition to all of this, is the threat of live imports which have been increasing in the California markets. While the future of the live import situation is not clear, there are some who feel that ways will be found to bring both live and frozen lamb into the United States if there is an opportunity to sell it here at an attractive price.

**Challenges to the sheep industry**

It must be recognized that the lamb import problem is a serious problem confronting the sheep industry. However, this issue must not overshadow the major objective of our sheep industry. It should be—how to get a larger share of the domestic meat market. For many years the per capita consumption of lamb in the United States has been declining or has been at a level lower than is desirable for a prosperous and growing sheep industry. The promotional work of the Lamb Council has been a move in the right direction, but even this program has been unable to accomplish all that has been desired of it.

A 37% increase in meat production is projected for 1975. The big question confronting all segments of the meat industry is, "Who is going to share most effectively in this expanded market?" Without attempting to detract one iota from the importance of the lamb import problem, this is still not the major competitor of our domestic sheep industry. The major competitor of our domestic sheep industry is the cattleman, or the hog producer or the poultryman who is out to capture the largest possible share of the present and projected market for meat. If the sheep industry concentrates its "big guns" on the import problem and neglects its domestic problem, the consequences are likely to be much more severe than if the emphasis of the attack were reversed.

The real questions are, "How can the domestic sheep industry streamline efficiencies of production to put out a more desirable and more uniform product which the consumer will prefer as compared to other meats. How to improve the efficiencies of distribution which will present to the consumer the most competitive and desirable product that is available. How can the industry better merchandise?" These, it seems to me, represent some of the major challenges ahead. The sheep industry must out-compete other segments of the meat industry if it is to capture a larger share of the total market.

The cold war of competition confronting the meat industry will continue in the decade of the '60's. During this time we must not overlook the role of the consumer and the importance that she will play in the big decisions that will affect the welfare of the sheep industry. The consumer doesn't care who produces the lamb and/or mutton that she will consume. She doesn't care whether it comes from Oregon, Kentucky or from Colorado. Or really, I suspect, she will begin to care less and less whether it comes from the United States or from some other part of the world. If she gets the kind of product she wants at the right time, in the right form and at the right price, this will decide which way she will go. The important strategy, it seems to me, is to really study what can be done to gear our domestic sheep industry to meet this new cold war.

At a recent meeting in California, I offered the suggestion that it might be very desirable for the sheep industry to set up a *fact-finding committee* similar to the one which was established by the American National Cattlemen's Association. A study committee of this type could review the problems and opportunities in detail and let the chips fall where they may. If the sheep man is really interested in where he will be in the 1970's, I submit that a study of this type would be a very valuable investment—one which would give some clues to the long-run prospects and potential of the domestic sheep industry. Sound facts are essential to sound planning. I am confident that the investment in such a proposal would be well justified in giving direction to the future of our domestic sheep industry.

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