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# Effect on Yield and Grade of Holding Lambs in Packer's Yards

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# EFFECT ON YIELD AND GRADE OF HOLDING LAMBS IN PACKER'S YARDS

by

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This thesis is approved as a creditable independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree, but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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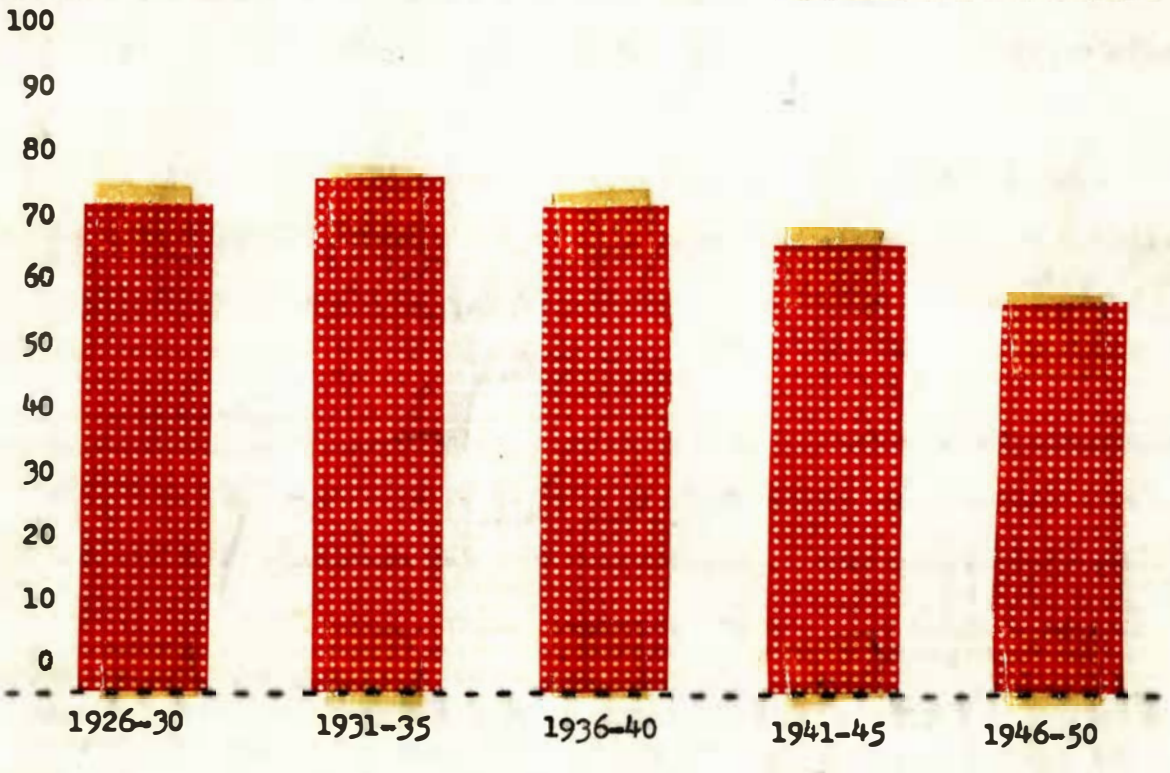
# CHAPTER I

## THE PROBLEM

The income from livestock and livestock products is of considerable importance to American agriculture. Gross farm income from the sale of livestock and livestock products constitutes over one-half of the total gross farm income. Regardless of the general economic level, livestock and livestock products are the major source of farm income in the United States and South Dakota.

Chart 1 shows the percent of total cash farm income received by South Dakota producers for livestock and livestock products.

CHART 1. PERCENT OF TOTAL CASH FARM INCOME RECEIVED FOR LIVESTOCK AND LIVESTOCK PRODUCTS - - SOUTH DAKOTA 1/




1/ South Dakota Crop and Livestock Reporting Service, "South Dakota Agriculture", 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949 and 1950.

Because of the importance of the livestock industry to farm income in the United States and South Dakota, any research or industrial progress to improve buying methods and grading standards will be of benefit to producers and also to the general welfare of all in the agricultural area.

## Market Development

In early days marketing problems were relatively unimportant as the population was primarily rural. The problems of marketing livestock became more complex with the growth of cities and towns.

Today animals may be sold directly to slaughter plants, public markets, auctions, dealers or other farmers. Refrigeration has made it possible to hold and ship fresh meat over the entire United States. With refrigeration, pork can be held six to seven days, beef and lamb twelve to fourteen days before being sold, and still retain initial carcass quality. In spite of improvements in refrigeration the meat industry is characterized by the need for rapid movement from producer to consumer.

The need for rapid movement from producer to consumer and the increasing public demands for certain types and grades of meat indicates a need for a reliable system of grading.

## Grade Factors

Official United States grade standards for livestock and livestock carcasses are defined in subjective or descriptive terms rather than on a basis of objective tests or measurements. Grading of livestock is done by visual and physical inspection of the live animals according to an ideal standard. This standard does not always indicate the actual carcass value. The livestock buyer must use his judgment to estimate the grade and carcass yield. In making this estimate, the buyer is guided by past experience regarding average yields and grades of

the particular type of livestock. For individual animals his judgment may not correspond to actual carcass yields and grades, although his average for a larger lot may be close to the actual average carcass yield and grade for the lot.

This present system of grading is based on three major grade factors--conformation, finish, and quality. Conformation is the balance or symmetry of the animal. The degree of conformation is determined by the proportionate relationship of width, depth and length of the body or carcass. Finish is the quantity of fat that covers the body, it also involves not only the amount but also its character and distribution. Quality is the refinement or breeding which influences the degree of excellence as a meat animal. The outstanding differences between animals in each grade consist chiefly of the various combinations of the three factors possessed by each individual animal.

## Factors Which Influence Returns

In all grading work, it is necessary that due consideration be given each factor. One carcass may possess prime conformation, good finish and choice quality. It is therefore a matter of balancing one factor against the other in determining the final grade.

There are three other factors which are often incorrectly referred to as grade factors, but which are actually price factors. They are weight, excessive finish, and carcass yield.

Weight is an important price factor in lambs. As a rule, heavy lambs are less in demand at the markets than animals of lighter weights. Lambs of the 70-90 pound weight group usually bring a higher price per pound than those weighing over 90 pounds. This price differential is largely the result of consumer preference for smaller cuts.

Excessive finish is a term used to refer to carcasses that have a large amount of fat in proportion to lean meat. This condition does not occur in lambs as often as in older sheep except where lambs have been fitted for show. Because of the lean-fat ratio these lambs are discriminated against in price per pound.

Carcass yield, or carcass weight in relation to live weight, is another element that affects the price of slaughter lambs. Since the meat of the animal is its principal product, the pounds of meat obtained from each 100 pounds live weight are of real importance and determine to a considerable extent the price of slaughter lambs. For this reason, yield is often considered a grade factor, and it is true that as a rule the higher yields are obtained from better grades while lower grades yield less. Yield and grade are closely associated, but yield is not a grade factor.

## A New Approach

One method that has been introduced as a way of improving the present marketing system is selling on carcass weight and grade basis. This method would base payments on the actual carcass value of livestock. While the present system of marketing is based on subjective estimates of yield and grade (which often reflect the personalities of companies and buyers) this system would be based on actual carcass weights and impartial or measurable grade standards. It seems desirable to develop objective grades that would differentiate carcasses as to the value of the wholesale cuts they would yield. Those carcasses which yield a large proportion of high value cuts would be priced higher than carcasses which yield more of the low value cuts, thereby paying

producers a more equitable price for their product which more directly reflects consumer preference. Sale by producers may be by description, or after inspection by the buyer at the market or on the farm. In either case, the bargaining is in terms of the price to be paid per 100 pounds dressed weight for carcasses that meet certain grade specifications. One disadvantage of this method is that the value of an animal sold by carcass grade and weight can be determined only after it has been slaughtered.

## CHAPTER II

## DEVELOPMENTS IN THE FIELD

In recent years research in marketing farm products has been given great emphasis in Agricultural Colleges of the United States. Prior to this time most changes that were brought about in marketing had been initiated by industrial groups. Recently this situation has come to the attention of legislators, who passed the Research and Marketing Act. This Act made possible allocation of federal funds to intensify and improve marketing of farm products including livestock. A part of this field which is undergoing major study is the economic problems of changing from marketing livestock by liveweight to the carcass weight and grade method.

Carcass weight and grade basis of marketing is a new approach to the selling of livestock in this country. It is not, however, a new method. Many countries are now and have been selling by this method for a number of years. Prior to instigating such a drastic change in our present method it seems highly desirable to review the procedures used and the problems which led to its development in other countries.

Marketing on carcass weight and grade basis has received favorable acceptance in several foreign countries. The livestock industry in these foreign countries faced different conditions and problems than are encountered here in the United States. Many of these countries produce for export markets which demand a certain type and quality product. The size of their livestock industry is smaller than that of the United States while packing plants are more decentralized. In the United States the packing industry is characterized by large

packing plants, a large number of livestock and production primarily for a domestic market which is varied in its preference for meat.

Foreign countries which have been leaders in developing this new method of marketing are Denmark, Sweden, Canada and Great Britain. However, even in these countries which were the forerunners in this development, the carcass weight and grade method has been largely confined to hogs. Cattle and sheep have been marketed by this method to some extent but more research has been needed to work out the problems involved with these species.

## Developments in Other Countries

### Denmark

Hog production is one of the major enterprises in Danish agriculture. The primary outlet for Danish hog products is export to other countries. It was therefore of vital importance for producers to develop a product which would find acceptance in the export market. This was achieved through marketing by a method which paid producers for the type and quality carcass that was sold. Adoption of such a new marketing practice was made more readily because 62 of 84 plants in the country were cooperatively owned. Another important factor which distinguishes Denmark's marketing system from that of the United States is that hogs are marketed uniformly throughout the year.

When the livestock is marketed, identity is maintained by means of metal ear tags, one in each ear. A Government veterinarian inspector examines each carcass as soon as the hog has been slaughtered. In the case of a diseased or condemned carcass the farmer is paid 60 percent of the value of a healthy carcass, the loss being absorbed by the plant. After inspection, each carcass is weighed by a municipal

weighmaster, and the weight and ear tag are recorded. The weight is stamped inside each ham. Carcasses are graded by a plant employee supervised indirectly by a government inspector. The price is established each week by a six member committee, who represent the cooperative slaughtering plants. The six man committee must decide on prices which will meet the export demand as the market must be cleared each week.

Sweden

The process outlined in the preceding paragraph is comparable to the method used in Sweden except that farmers receive a price based on warm weight, less 4 percent shrink, and on the grade of the carcass. Marketing in both Denmark and Sweden is relatively simple as hogs are ear marked and hauled to the nearest plant for slaughtering, weighing, grading, and processing. This eliminates the usual marketing expense including yardage fees, feed and selling commission, and reduces tissue shrinkage to a minimum.

Canada

United States research people look to Canada for partial solution to many problems which they are facing. Canada, unlike Denmark and Sweden, is a large country, the number of livestock produced is much larger, and packing plants are less decentralized. One other distinguishing factor is that more outlets are available to the producer. But Canada, unlike the United States, produces for an export market.

The problem of inferior quality bacon after World War I became so acute that Canadian hog raisers met and recommended the adoption of a national live-hog grading system. This system often resulted in disputes over the grade and the final settlement would not come until

after the carcass has been graded. As the carcass grade was considered final this method of selling automatically changed to the carcass grade and weight basis, which has now been accepted. However, producers have the option of selling on a live weight basis. At the present time over 50 percent of the hogs sold are sold by carcass weight and grade in Canada.

The procedure in Canada is different from that used in Denmark and Sweden in that hogs are identified with tatoo ink. The price is established in similar manner but a charge of 0.5 percent of the purchase price of live hogs is used to offset loss due to bruising and disease. This charge is made on all hogs sold irregardless whether they are sold by the carcass or on a live basis.

Great Britain

Great Britain, unlike other foreign countries prominent in carcass weight and grade marketing does not depend on export trade. Practically all meat produced in Britain is consumed in that country.

The common method for selling livestock for years was by the head. This custom has been very difficult to break. Acts have been passed which required installation of weighing facilities at market centers. These acts were disregarded by the producers who actually should have benefited by them. Progress in selling by the live-weight basis has been extremely slow. Even today a relatively small percentage of animals sold are sold on the live-weight basis and an even smaller percentage sold on carcass yield and grade. The later method is, however, gaining acceptance, especially with hogs. There are two

systems of marketing livestock by carcass grade and weight in Great Britain: (1) Optional sale of fat stock, excluding bacon hogs; (2) marketing bacon hogs.

Marketing the fat stock, other than bacon hogs, by carcass weight and grade is done through the Ministry of Agriculture and Fisheries. The producer requests price quotations from one of the grading centers established by the Ministry. The request must be accompanied by a description of the animals, including the number, breed or type, sex and approximate live weight. The head grader of the Ministry of Agriculture then contacts wholesalers on the market to obtain their bids. The producer may accept or refuse the bid. If the bid is accepted the livestock is shipped to this wholesaler for slaughter. The producer must pay the transportation charges plus one-half the insurance premium to cover costs of bruises, death loss and condemnation. Under this plan the producer is able to reduce market costs by direct marketing. He is assured of impartial weights supervised by the government and receives the market value for the weight and grade of livestock offered for sale.

The plan which has been established for bacon hogs is not under a governmental board but administered by an organization of producers. Under this agreement producers are subject to specified penalties for noncompliance to deliver all bacon hogs to the bacon factories. 2/

Farmers are paid in full for all hogs condemned or killed in shipment by a fund assessed at a rate of 12 cents per bacon hog

2/ Shepherd, Geoffrey, Livestock Marketing Methods in Denmark, Great Britain, and Canada, Iowa Agricultural Experiment Station, Bulletin 353, January 1937.

slaughtered. The prices are determined from the wholesale prices of bacon and of a combination of hog feeds. This formula is used the entire year with monthly adjustments.

Developments in the United States

In the early years of the 20th century producers and some packers became interested in improving the liveweight marketing procedure. The United States Department of Agriculture and Land Grant College Experiment Stations began developing grade standards which would improve buying techniques.

In 1904 the Illinois Agricultural Experiment Station published a bulletin on "Market Classes and Grades of Swine". 3/ The United States Department of Agriculture issued tentative grade standards for slaughter barrows and gilts in 1931. 4/ In 1924 tentative U. S. standards were established for pork carcasses. 5/ These carcass standards were revised in 1933. 6/ These swine grades have received a limited adoption in the U. S. mainly because by these grades it was

3/ Detrick, William, "Market Classes and Grades of Swine", Illinois Agricultural Experiment Station, Bulletin 97, November, 1904.
4/ Tentative U. S. Standards for Classes and Grades of Slaughter Barrows and Gilts, Bureau of Agricultural Economics, United States Department of Agriculture, Mimeograph, July 31, 1931.
5/ Specifications for the Purchase of Pork Carcasses and Cuts and Miscellaneous Meats, Bureau of Agricultural Economics, United States Department of Agriculture, Mimeograph, March, 1924.
6/ Davis, W. C., McCarthy, B. F. and Burgess, J. C., Market Classes and Grades of Pork Carcasses and Fresh Pork Cuts, United States Department of Agriculture, Circular Number 288, October, 1933.

assumed that a choice hog would produce a choice carcass and also choice cuts. More recent research has disproven this idea. Then, too, practically all pork is sold by carcass cuts or as a processed product.

The grade standards proposed for cattle and sheep have found more practical use than the swine grades. This can probably be attributed to the fact that subjective grade standards are more easily determined in these animals. Quality, finish and conformation can be seen or felt in cattle or sheep. Tentative grade standards for cattle were used for market reporting in 1916 and later released as official U. S. grade standards. 7/ An association of cattlemen and beef processors reached an agreement to grade carcasses in accordance with U. S. standards in 1927 on an experimental basis. 8/ In June, 1928 this procedure as an experiment ended and slaughterers paid a fee for the service. 9/ Under this plan all grading is done by a government grader. The purpose of this was to standardize the product, thus educating the consuming public as to the product they were buying.

Grades of sheep and lamb were first set up in a bulletin published by the Agricultural Experiment Station at Illinois in 1908. 10/ These were the forerunners of a U. S. D. A. study and the final publication of official U. S. sheep and lamb grading standards. Like the beef grading the sheep and lamb grading of carcasses was adopted by

7/ Davis, W. C., Beef Grading and Slaughtering Service, United States Department of Agriculture, Leaflet No. 67, September, 1930.

8/ Ibid.

9/ Ibid.

10/ Davis, W. C. and Burgess, J. A., Market Classes and Grades of Dressed Lamb and Mutton, United States Department of Agriculture, Bulletin 1470, March, 1927, slightly revised August 1942.

slaughterers and a federal grader did the grading. The grade standards were revised April 30, 1951. 11/

## Guaranteed Yield

An important development in the hog marketing practice was the guaranteed yield method of selling. This probably was the first step toward carcass grade and weight marketing in the United States. Under this plan livestock were assembled in cooperative association yards. Here they were sorted, grouped and sold to slaughtering plants to yield a specified dressing per cent. If the hogs yielded more or less than the guaranteed yield a price adjustment was made. 12/

The difficulties which were encountered and finally led to the discontinuance of this practice were: (1) the question of accuracy of the dressed weights as determined by the packer; (2) hostilities of the public market interest; (3) difficulty of reaching a satisfactory agreement with packer as to the guaranteed yield; (4) inability of local association managers to estimate yield; (5) failure to return to producer the payment for exact weight of carcass delivered. 13/

11/ News Release, United States Department of Agriculture, 794-51.
12/ Dowell, Austin A. and Bjorke, Knute, "Livestock Marketing", Chapter XIX, published 1941, page 418.
13/ Ibid.

## Research in United States

Prior to World War II interest in the Canadian system of marketing grew to a point that colleges and a few packers began research to determine its desirability and practicability in the United States. Hogs were used predominately in early experimental work to establish standards for marketing on carcass weight and grade since buying practices showed little or no consideration to sorting or pricing of hogs on a quality basis. As experimentation progressed other species of livestock were used.

The Agricultural Experiment Station at Iowa State College conducted one of the pioneer studies of marketing hogs on carcass weight and grade. This study found that experienced packer buyers were not able to appraise accurately the cut-out value of individual hogs. 14/ About this same time the Hormel Packing Company conducted carcass studies. The first method tried at Hormels was a plan of buying hogs on the basis of wholesale cuts. This method greatly reduced the speed of processing and increased the expense of settlement. 15/ This experiment was discontinued and the following year a new project of buying according to carcass weight and grade was started. The carcass weight and grade project was discontinued after two years study as it was felt more investigation was needed to determine grade standards.

14/ Shepherd, Geoffrey, Beard, Fred J., Erickson, A., "Could Hogs Be Sold By Carcass Weight and Grade in United States", Iowa Agricultural Experiment Station, Bulletin 220, January, 1940.

15/ Thompson, Samuel H., Economic Trends in the Marketing of Iowa Livestock, Doctoral Thesis, University of Minnesota, December, 1937.

Various agricultural experiment stations began work following World War II on studies of comparison between live and carcass grades. These studies involved veal calves, cattle, hogs and sheep and quite often found a discrepancy between the grading, thus pointing out the desirability of carcass weight and grade buying.

In 1947 the North Central Livestock Marketing Research committee adopted the project "Marketing Slaughter Livestock by Carcass Weight and Grade".

This project, designed to study the problems pertinent to carcass grade and weight marketing, divided the problem into sub-projects by species of livestock. The various states concentrated their research to one or more of these sub-projects.

Two of the member states, Kentucky and South Dakota, concentrated their studies on the problems involved in marketing lambs by the carcass weight and grade basis.

The Kentucky Station has published no results. Results of the South Dakota project on pricing accuracy of the liveweight method were published in the Agricultural Experiment Station Bulletin No. 416, "Marketing Lambs" 16/, December, 1951. This study involved 32 lots consisting of 487 individual lambs. The purpose of the study was to investigate the present system of estimating the grade and yield of live lambs. The methods used in the study were to have a buyer at

16/ Nervik, Ottar and Paterson, David G., Marketing Lambs - Comparison of Liveweight Method and Carcass Weight and Grade Method, South Dakota Experiment Station Bulletin Number 416, December, 1951.

a local plant and a livestock specialist from the S. D. Experiment Station make estimates of grade and yield. These estimates were then compared with actual yields and with carcass grades. The carcasses were graded by a Federal grader, packing plant grader and a representative of the Experiment Station. Each lamb was graded individually, each full grade being divided into three subgrades which were assigned numerical values.

The conclusions of this study were that estimates of carcass grades and weights from live animals are not accurate. Grades for better quality lambs tended to be underestimated while lower grades were over-estimated thus tending toward a median or average.

Summary of Developments

Carcass weight and grade method of buying has not been used in the United States on a commercial basis. Should it be found to be more accurate than present marketing practices, as preliminary studies indicate, the next step would be to ascertain its practicability under actual packing house conditions which are present in this country.

Various livestock marketing groups differ in their opinion in the merits of the carcass weight and grade method of marketing. It must be realized that all studies so far have been preliminary and are not conclusive enough to justify initiating a complete switch over from our present marketing system. If the present method reflects true grade and weight of the product as well as the most accurate return there is no further need of proposing this method. The studies which have been made do, however, suggest our present system does not reflect the true value of the animals slaughtered.

Even though the carcass grade and weight method is proved more accurate, would such a method be practicable in the United States? The following quotation particularly pointed out the problems involved.

> "It is important to note however, that before we know the true possibilities of this method of marketing we must consider not only its desirability but also its practicability. There are a number of problems that need to be solved before the question of practicability can be answered affirmatively. These problems include a satisfactory method of identification, the effect of slaughtering costs, a method of adjusting for differences in by-product values, the extent of tissue shrinkage when animals are held various periods of time before slaughter, and some others. The result of studies today indicate the need for further research in this field both to further test the results obtained thus far on desirability, and to shed light on the relatively unexplored problems of the practicability of rail grading". [17]

[17] Paterson, David G., Journal of Farm Economics, February, 1949, page 367.

## CHAPTER III

## THE STUDY

### Objectives

One problem pointed out in the proceding quotation was concerned with the effect of holding over lambs in the packing plant yards. Is there a weight and/or grade loss due to this holdover? If so, how much and on what basis should a price adjustment be made?

This study was undertaken to develop information on whether a price adjustment was necessary as a result of hold-over of lambs in the packers yards prior to slaughter.

The primary objective of this study was to determine the effect hold-over for a period of three days in the packing plant yards had on the carcass yield and grade of slaughter lambs. Secondary objectives of this study were to: (1) study effect of temperature on shrink; (2) the effect of time in transit on shrink in packers yards and; (3) a method of making price adjustment for loss to the farmer as a result of hold-over which is beyond his control.

No previous study of this nature has been conducted. A previous study 18/ by Knute Bjorka, Agricultural Economist of the Bureau of Economics, was concerned with weight losses of hogs in the marketing process. The major emphasis of that study was directed toward weight loss in transit rather than the hold over in packing plant yards. For this reason it is valuable to this study only as a guide.

### Procedure

A study of this nature entails certain assumptions and methods which have direct effect on the results. This study is one step in

18/ Bjorka, Knute, "Shrinkage and Dressing Yields of Hogs", Bureau of Agricultural Economics, United States Department of Agriculture, Technical Bulletin No. 621, Washington, D. C., 1938.

the broader problem of determining whether introduction of the carcass weight and grade marketing is desirable and practical. No such experiment of practical implications on the carcass grade and weight basis has previously been made.

The methods used in this study were aimed to obtain uniformity of individual lots and sublots within those lots. Seventeen lots of 54 lambs each were included in the study. The important factor was to obtain on the initial day (when lambs were graded and weighed alive) three sublots of 18 each which would when taken as a whole be of approximately the same type meat quality. To obtain these uniform sublots the lot of 54 lambs were divided, by live grade, into three groups of 18. One group contained the 18 best, or top, one contained the 18 mediu, or middle, lambs and one contained the 18 poorest lambs of the lot of 54. Sublots were then set up including 6 from each of the three groups. These sublots then contained lambs which were of as nearly as possible uniform quality. Under this assumption it was therefore possible to contribute any variance that was present as a result of hold-over in the packing plant yards.

A direct comparison of lots could not be made as it is impossible under normal plant operations to obtain animals of specific weight, condition and quality. The comparison had to be made between the first, second, and third day slaughter and also between the lambs of the three groups. There are variations both between and within lots but the break down into sublots of six of each group tends to minimize the variance between sublots within a given lot. Metal ear tags were used to maintain identity through the slaughtering process.

## Collection of Data

This study is based on primary data collected at a local South Dakota packing plant and covered a period of approximately five months, beginning in August and ending in December, 1950. The lots were therefore distributed through the summer, fall and early winter months to obtain information of any variations due to temperature. During this period seventeen lots of 54 lambs were studied. An effort was made to select lambs upon arrival at the packing plant and also select the total lot from the same shipment. There were, however, six lots which had arrived one day prior to the live grading and weighing.

## Lots

Selection of the lot of 54 lambs was done on a random or "gate run" basis. The live lambs were graded by a representative of the State Experiment Station. The object of this grading was to obtain uniformity in the sublots, therefore, no attempt was made to grade by the official United States lamb live grades. The 54 lambs, by this live grading, were divided into three groups: (1) the 18 top quality; (2) the 18 medium quality; and (3) the 18 poorest quality within each lot.

## Sublots

Following the live grading, lambs were run into a chute where they were individually ear tagged. From the chute lambs were weighed individually on a regular platform scale. As the individual lambs were released from the scale they were split into three sublots of 18. Each sublot containing 6 top, 6 medium and 6 low grade lambs.

The sublots were obtained in the following manner: the first six top graded lambs weighed, the first six medium grade lambs, and the first 6 low grade lambs were in sublot 1. The second and third sublots were obtained in a similar manner. Each sublot was therefore selected on a "gate run" method as no other effort was made to control the division of lambs into sublots.

The data was recorded for the individuals in each sublot on a standard mimeographed form. (Appendix B)

The three sublots were then slaughtered on succeeding days. The first sublot of 18 being slaughtered the same day as being graded by the Experiment Station representative.

## Yield or Dressing Percentage

The term yield used in this study is synonymous with dressing percentage. The method of calculation was to divide the carcass weight by the original live weight. Carcass weight obtained the day killed, liveweight obtain the first day. The carcass weight does not include the edible by-products of heart and liver. The carcasses were weighed on a warm basis with a three percent discount being made for shrink. The carcass weight therefore was based on a cool basis.

## Carcass Grading

All carcasses were graded by the official Government grader at the local packing plant. These grades were based on official United States standards for lambs. Each full grade was divided into three sub-divisions. (e.g. high good - good - low good) The carcass grades were all reported by these one-third grade classifications. Each one-third grade division was given a numerical value ranging from 1 to 13. (Appendix C) All lamb carcasses were graded the day following slaughter.

## Holding Condition and Ration

No deviation was made from the usual packing plant holding conditions other than maintaining sublots in separate pens. Lambs were held in pens until slaughter and then driven up the ramp to the kill.

The ration, which was fed free choice, was the usual ration used and consisted of native hay, ground alfalfa hay mixed with molasses, and water.

## Grouping of Data

An effort was made to obtain results on three classifications of lambs; (1) western, (2) native, and (3) fed lambs. The western lambs were lambs which had been in transit three or more days and were produced under range conditions. Native lambs were those less than one day in transit and produced on local diversified farms. The fed lambs were taken directly from a feed lot operated by the packer in the immediate vicinity of the packing plant and included both native and western lambs.

The data was also grouped and summarized on a lot, live grade and the day slaughtered basis.

## Statistical Measures

All data collected was analyzed by standard statistical tests. The tests applied were analysis of variance, to measure the dispersion between sublots and days, and the standard t test. These tests were applied to all the various groupings as well as on an overall basis of all lambs studied.

# CHAPTER 4

## ALL LOTS

The question of weight loss due to hold-over in the packing plant yards for a period of time is a problem of practical nature. It is of special importance under carcass weight and grade marketing to insure producers returns which reflect the value of their livestock at the time they relinquished possession of them. It is of more importance by the carcass weight and grade method because it is the actual carcass which is the basis of settlement. Should livestock drop one carcass grade due to a three day hold-over this would be a loss to the producer because of conditions beyond his control.

### Yield

All lots were analysed on an individual lot basis. 19/ This study of 17 lots including a total of 918 lambs indicated little effect on carcass yield as a result of hold-over for a period of three days. (table 1) The variance between days was small. Only lots 3, 4, and 5 indicate a highly significant difference. 20/ It is important to note that in these highly significant lots the variance was not uniform. In lot 3 the yields declined the second and third day. In lot 4 the second day's yield was high. The yield in lot 5 increased the second day and showed further increase the third day. Lot 11 shows slight significance dropping from first to third day.

19/ Appendix C, item 2 and Appendix D page 76-88

20/ In this study highly significant differences refers to a difference which is statistically significant at the 1 percent level. A significant difference is a difference which is statistically significant at 5% level.

Table 1. Average Lot Yields of 17 Lots of Lambs

| Lot | Day 1 | 2 | 3 |
|---|---|---|---|
| 1 | 52.7 | 52.8 | 53.3 |
| 2 | 48.8 | 48.8 | 48.8 |
| 3 | 51.3 | 49.3 | 48.2 |
| 4 | 51.8 | 56.6 | 54.2 |
| 5 | 53.6 | 52.8 | 55.8 |
| 6 | 49.0 | 49.3 | 49.9 |
| 7 | 53.3 | 52.7 | 51.5 |
| 8 | 49.6 | 49.6 | 47.6 |
| 9 | 51.4 | 51.3 | 50.6 |
| 10 | 51.9 | 51.0 | 50.0 |
| 11 | 49.8 | 48.8 | 46.9 |
| 12 | 52.9 | 51.5 | 51.3 |
| 13 | 49.4 | 48.9 | 49.0 |
| 14 | 50.3 | 50.3 | 48.4 |
| 15 | 51.6 | 50.7 | 49.9 |
| 16 | 50.0 | 48.1 | 48.9 |
| 17 | 50.6 | 50.6 | 49.9 |
| Mean (all lambs) | 51.0 | 50.8 | 50.3 |

Yield in ten of the lots shows a decline from the first to third day, in one yields were the same for the three days, two rose from first to third day, three declined the second day and increased the third while one increased the second and then declined on the third day.

Four of the 17 lots indicated that there was a significant relationship between the live groupings of top, medium and low.

Analysis of variance tests of the interaction of groupings and days indicated no significance with one exception. This exception was lot no. 5. In this lot a highly significant difference was found between the live grouping and the day killed.

## Carcass Grades

Carcass grade does not vary significantly between days kill, nor is there a uniform variance from day to day. 21/ (table 2) In eight lots the carcass grade declined from first to third day, two lots increased from first to third day, five lots declined the second and increased the third while carcass grades in two lots increased the second day and declined again on the third.

Table 2. Average Carcass Grade all 17 Lots

| | Day | | |
|---|---|---|---|
| Lot | 1 | 2 | 3 |
| 1 | 8.0 | 7.0 | 7.3 |
| 2 | 6.6 | 7.1 | 6.8 |
| 3 | 8.2 | 7.3 | 7.3 |
| 4 | 7.8 | 7.6 | 6.8 |
| 5 | 7.7 | 6.7 | 7.3 |
| 6 | 7.3 | 6.9 | 7.3 |
| 7 | 6.5 | 6.3 | 6.2 |
| 8 | 6.2 | 6.7 | 5.2 |
| 9 | 6.9 | 6.7 | 6.8 |
| 10 | 7.6 | 7.2 | 8.0 |
| 11 | 7.2 | 6.3 | 5.4 |
| 12 | 8.1 | 7.2 | 8.8 |
| 13 | 6.6 | 6.8 | 7.1 |
| 14 | 6.7 | 6.4 | 6.2 |
| 15 | 7.2 | 6.7 | 5.8 |
| 16 | 6.9 | 6.6 | 5.9 |
| 17 | 7.0 | 7.4 | 8.2 |
| Mean (all lambs) | 7.2 | 6.9 | 6.7 |

There were no highly significant differences present in any lot between the grades in the three days kill. Had the grades been full grades (as described by the USDA) there would have been even less variance. Three lots indicated a significant difference at the five percent level. These were lots 11, 15, and 17.

21/ Appendix C, page 83-88.

Lots 11 and 15 decreased from first to third day while the reverse was true of lot 17, thus indicating no uniform pattern in loss of carcass value.

In testing the results of lambs as to the original liveweight groupings to top, medium and low, it was found there was a highly significant relationship in 11 lots, significant relationship in two and no significance in four. This indicates that the original live grouping corresponds very closely to the carcass value. In other words the top, middle and low lambs had been divided in such a way as to produce uniform sublots.

Only in two lots was there significant variance between the live grouping and the kill of the three day period. This means that the data did not indicate that grade losses varied with the live grade grouping. In two lots there were only five chances out of 100 that the variance could have happened due to chance alone.

## CHAPTER 5

## WESTERN LAMBS

Lambs classified as western are those lambs which were produced under range conditions. These lambs were raised in western South Dakota, Montana, Wyoming and some in Idaho. All western lambs studied were slaughtered directly from the range.

Western lambs had been in transit for a period of three to six days prior to arrival at the local slaughtering plant.

Lots 1, 2, 3, 5, 6, and 7 totaling 324 lambs were in this classification.

### Yield

Three lots indicated a highly significant difference in yield over the three day period. 22/ All the other lots show no significant difference. The significance shown was not uniform. The mean yield in lot 3 decreased from first to third day. Lot 4 yield increased the second day and remained higher than the first day on the third. Lot 5 increased from first to third day.

Table 3. Average Lot Yield of Western Lambs - Lots 1, 2, 3, 5, 6, 7

| | Day | | |
|---|---|---|---|
| Lot | 1 | 2 | 3 |
| 1 | 52.7 | 52.8 | 53.3 |
| 2 | 48.8 | 48.8 | 48.8 |
| 3 | 51.3 | 49.3 | 48.2 |
| 4 | 51.8 | 56.6 | 54.2 |
| 5 | 52.6 | 52.8 | 55.8 |
| 6 | 49.0 | 49.3 | 49.9 |
| 7 | 53.3 | 52.7 | 51.5 |
| Mean | 51.4 | 51.7 | 51.7 |

22/ Appendix D pages 76-79.

Table 3 indicates no uniform behavior in yield of western lambs which had been in transit for a 3 to 6 day period. Three lots increased yield, two declined while one lot yielded the same over the three day period.

The average daily mean of all western lambs indicates that these lambs do show a slight yield increase if held one day prior to slaughter. Lambs held two days yield more than those slaughtered the first day.

The yield of lambs as grouped on a live basis did not vary significantly.

One lot indicated significant interaction of yield in relation to live grouping and the day killed.

## Carcass Grade

The carcass grade of the western lambs indicated no significance between the three day period in any lot. 23/ The average carcass grade did decline slightly over the three day period.

Table 4. Average Lot Carcass Grade of Western Lambs

| | Day | | |
|---|---|---|---|
| Lot | 1 | 2 | 3 |
| 1 | 8.0 | 7.0 | 7.3 |
| 2 | 6.6 | 7.1 | 6.8 |
| 3 | 8.2 | 7.3 | 7.3 |
| 4 | 7.8 | 7.6 | 6.8 |
| 5 | 7.7 | 6.7 | 7.3 |
| 6 | 7.2 | 6.9 | 7.3 |
| 7 | 6.5 | 6.3 | 6.2 |
| Mean | 7.4 | 7.0 | 7.0 |

23/ Appendix D, page 83-86.

In testing the carcass grade as it related to the live grade grouping, all but two lots indicated high significance present. This indicated that the live grading of western lambs did group them into uniform sublots within each lot.

The test of interaction between live grade and the three day kill indicates no significance in any lot.

## CHAPTER 6

## NATIVE LAMBS

Native lambs are those which had been produced under diversified farming conditions, usually secondary enterprises consisting of small flocks. These lambs had been in transit less than one day on arrival to the local packing plant.

There were 8 lots (Numbers 9, 11, 12, 13, 14, 15, 16, 17) or a total of 432 native lambs studied.

These lambs indicated some feeding but were not long fed. The feed they received prior to marketing was in all probability from cleaning up stubble and other grain fields.

### Yield

Yield of native lambs did not vary significantly over the three day period. 24/ Only in lot 11 was there an indication of difference and this difference was significant only at the five percent level.

The mean of all native lambs indicates a consistant decrease from first to third day. (table 5)

Table 5. Average Lot Yield of Native Lambs - Lots 9, 11, 12, 13, 14, 15, 16, 17.

| | Day | | |
|---|---|---|---|
| Lot | 1 | 2 | 3 |
| 9 | 51.4 | 51.3 | 50.6 |
| 11 | 49.8 | 48.8 | 46.9 |
| 12 | 52.9 | 51.5 | 51.3 |
| 13 | 49.4 | 48.9 | 49.0 |
| 14 | 50.3 | 50.3 | 48.4 |
| 15 | 51.6 | 50.7 | 49.9 |
| 16 | 50.0 | 48.1 | 48.9 |
| 17 | 50.6 | 50.6 | 49.9 |
| Mean (all native lambs( | 50.8 | 50.0 | 49.5 |

24/ Appendix C, page 80-82

Six of the eight lots decreased from first to third day. Two lots decreased the second and increased on the third day. The third day yields were, however, lower than the first. Native lambs decline in yield after the first day but this decline was not statistically significant on an individual lot basis.

There was an indication that the lambs classified as top, medium, and low did vary as to the yield. Four of the eight lots indicated significant difference between yields of the live groupings top, medium and poor. This is in accordance with the belief that better quality lambs yield higher than lower quality lambs.

The mean of all native lambs indicates that native lambs will decrease from first to third day. This decrease is not, however, statistically significant in any individual lot.

## Carcass Grades

Carcass grades of native lambs indicate the same general pattern found true of yield. Six lots decreased in grade from first to third day. Two lots increased in carcass grade from the first to third day. (table 6)

Table 6. Average Lot Carcass Grade of Native Lambs - Lots 9, 11, 12, 13, 14, 15, 16, 17.

| | Day | | |
|---|---|---|---|
| Lot | 1 | 2 | 3 |
| 9 | 6.9 | 6.7 | 6.8 |
| 11 | 7.2 | 6.3 | 5.4 |
| 12 | 8.1 | 7.2 | 6.8 |
| 13 | 6.6 | 6.8 | 7.1 |
| 14 | 6.7 | 6.4 | 6.2 |
| 15 | 7.2 | 6.7 | 5.8 |
| 16 | 6.9 | 6.6 | 5.9 |
| 17 | 7.0 | 7.4 | 8.2 |
| Mean (all native lambs) | 7.1 | 6.8 | 6.5 |

In only one lot was there evidence of a decline in grade the second day and an increase on the third day. These results of native lambs indicate that a minor advantage is obtained by slaughtering the lambs on arrival.

Seven of the eight lots indicated that the lambs grouped on a live basis actually were placed in the right grouping. That is, the lambs grade top alive did produce the best carcass.

## CHAPTER 7

## FED LAMBS

Fed lambs were those which had been fed in the packers yards. They included both Western and Native lambs. These lambs had not been in transit prior to being studied. They had been moved a short distance from feed lot to slaughter plant.

This classification consists of two lots, 8 and 10, or a total of 108 individual lambs. The lambs in lot 10 had been shorn previous to slaughter.

### Yield

Fed lambs did not vary in yield significantly over the three day period. 25/ The mean of both lots declined during the three day period. (table 7)

Table 7. Average Lot Yield of Fed Lambs

| | Day | | |
|---|---|---|---|
| Lot | 1 | 2 | 3 |
| 8 | 49.6 | 49.6 | 47.6 |
| 10 | 51.9 | 51.0 | 50.0 |
| Mean (all fed lambs) | 50.8 | 50.2 | 48.8 |

This study included only a limited number of fed lambs which had come directly from the plant feed lot. The mean yield declined over the three day period but this decline was not significant.

The mean yield of all lambs in the fed lots was not significant although it does further indicate that yield decreased.

25/ Appendix D, page 79-80.

## Carcass Grades

Carcass grades of fed lambs did not show a definite pattern of increase or decrease. The grades in lot 8 remained the same on the second day and show a decline on the third day. This decline from second to third day does not indicate significance. 26/ In lot 10 the third day yield was the highest. (table 8)

Table 8. Average Lot Carcass Grade of Fed Lambs - Lots 8 and 10

| | Day | | |
|---|---|---|---|
| Lot | 1 | 2 | 3 |
| 8 | 6.8 | 6.8 | 6.2 |
| 10 | 7.6 | 7.2 | 8.0 |
| Mean (all fed lambs) | 7.2 | 7.0 | 7.1 |

The mean of all fed lambs shows very little variance between the carcass grades of lambs slaughtered between first and third day. There is a reduction on the second day. The second day reduction is, however, offset by increases on the third day. Individual lambs did not indicate a similar pattern.

There was no significance present of live grouping and carcass grade thus indicating that there was not significant relationship of that live grouping and carcass grades.

The interaction of grade and days indicated no significance.

26/ Appendix D, page 85-86.

## CHAPTER 8

## POOLED VARIANCE BY GROUPS

The analysis of lots, on an individual basis, indicated significant difference only in a few lots. These differences were not uniform in the yield data. Results in some lots, which indicated significance, show an increase of yield from first to third day while other lots show the reverse. It therefore seemed desirable to pool the variance of individual lots.

The pooling of individual lots was in accordance with the classification western and native. This method was followed because of the difference in pattern of the two groups of lambs.

Fed lamb data was not pooled because of the small sample tested.

### Yield of All Lots of Western Lambs

Western lambs did not show any consistent pattern. In two of the lots, which show significant differences, the yields recorded were so high as to indicate the possibilities of errors in recording weights. Pooled data for western lambs would therefore not give any definite conclusions.

The test of pooled difference of western lamb yield, over the three day period, indicated that there was a highly significant difference present as to the day slaughtered. Because of the factors mentioned above, caution should be exercised in interpreting these results. (table 9)

Table 9. Pooled Analysis of Variance - All Lots of Western Lambs Yield

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| Total | 371 | 3277.7 | | |
| Day | 14 | 427.1 | 30.5 | 1/ |
| Live Grade | 14 | 208.8 | 14.9 | 2/ |
| Day X Live Grade | 28 | 288.2 | 10.3 | - |
| Error | 315 | 2351.8 | 7.4 | |

1/ Highly significant.
2/ Significant.

Live grades of western lambs indicated slight significance. That is there was a difference in yield between the live grouping of top, medium and low lambs.

The test of interaction between the day slaughtered and the live grade did not indicate a significant variance. Live grades were consistent in that the top lambs did yield higher than low grade lambs regardless of the day slaughtered.

## Carcass Grade of All Lots of Western Lambs

Pooled analysis of carcass grade of all western lambs indicates no significance due to the day killed. (table 10)

Table 10. Pooled Analysis of Variance - All Lots of Western Lambs Carcass Grade

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| Total | 371 | 1016 | | |
| Day | 14 | 37 | 2.6 | |
| Live Grade | 14 | 205 | 14.6 | 1/ |
| Day X Live Grade | 28 | 55 | 2.0 | |
| Error | 315 | 719 | 2.3 | |

1/ Highly significant.

A highly significant difference was present between live grading or grouping and the final carcass grade. Lambs of the top live grouping in this experiment did grade higher than lambs of low grade grouping.

There was no indication of a significant interaction between the day slaughtered and live grouping.

Yield of All Lots of Native Lambs

Native lambs show a more uniform pattern over the three day period. As brought out in Chapter 6, the mean yield and grade of native lambs shows a consistent decline from first to third day.

On the pooled basis native lambs do not indicate a significant difference present in regard to the yield over the three day period. However, lambs slaughtered the first day did yield more than those held two or three days. The mean of all lambs slaughtered the first, second and third day were 50.8, 50.0 and 49.5, respectively. (table 11)

Table 11. Pooled Analysis of Variance - All Lots of Native Lambs Yield

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| Total | 424 | 5219.8 | | |
| Day | 16 | 227.3 | 14.2 | - |
| Live Grade | 16 | 609.7 | 38.1 | 1/ |
| Day X Live Grade | 32 | 360.7 | 11.3 | - |
| Error | 360 | 4022.1 | 11.2 | |

1/ Highly significant.

There was a highly significant difference present between live grouping of top, medium and low. Lambs of top live groupings yielded more than low live groupings in this experiment.

The interaction test of live grade and day slaughtered indicated no influence on the yield.

Carcass Grade of All Lots of Native Lambs

Pooled data of the carcass grade of lambs slaughtered indicates significance at the 5 percent level. There is an advantage of slaughtering lambs on arrival at the plant. Carcass grades significantly decline during the three day hold-over period. (table 12)

Table 12. Pooled Analysis of Variance - All Lots of Native Lambs Carcass Grades

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| Total | 424 | 1468 | | |
| Day | 16 | 85.3 | 5.3 | 2/ |
| Live Grade | 16 | 345 | 21.6 | 1/ |
| Day X Live Grade | 32 | 92.5 | 2.9 | - |
| Error | 360 | 945 | 2.6 | |

1/ Highly significant.
2/ Significant

Native lambs, as was true of western, do indicate a difference in carcass grade in regard to the live grouping. Lambs of the higher live grouping did produce better carcass grades.

No significance was present between the day killed and live grade.

## CHAPTER 9

## TEMPERATURE

This study was conducted during the period August 7 to December 29, 1950. The average weekly temperature was obtained from the United States Weather Bureau located at the same town as the co-operating packing plant.

Temperatures were averaged for the weeks when the lambs were slaughtered. Temperatures ranged from 15 degrees fahrenheit to 73 degrees fahrenheit.

Table 13. Average Weekly Temperature, Lot and Classification of Lambs Slaughtered During That Period.

| Lot No. | Average Temperature | Decline or increase in yield 1/ from lot to third day | Lot Classification |
|---|---|---|---|
| 1 | 68 | / | Western |
| 2 | 73 | Same | Western |
| 3 | 68 | - | Western |
| 4 | 63 | * | Western |
| 5 | 68 | X | Western |
| 6 | 66 | / | Western |
| 7 | 58 | - | Western |
| 8 | 63 | - | Fed |
| 9 | 59 | - | Native |
| 10 | 55 | - | Fed |
| 11 | 49 | - | Native |
| 12 | 48 | - | Native |
| 13 | 32 | X | Native |
| 14 | 24 | - | Native |
| 15 | 19 | - | Native |
| 16 | 20 | X | Native |
| 17 | 15 | - | Native |

1/ / Indicates yield increased.
- Indicates yield declined.
* Increased 1st to 2nd day, declined the 3rd.
X Decreased 1st to 2nd day, increased 3rd day.

## Temperature vs Yield

There is little indication of yield variance due to temperature. The yields of lambs over this period of fluctuating temperatures did not indicate any consistent relationship.

Even at the same average temperature the yield of lambs varied. In lot 1, 3 and 5 the average weekly temperature was 68 but the yield of lambs over the three day period varied.

Ten of the lots decreased from 1st to 3rd day while temperatures varied from 15 degrees to 68 degrees fahrenheit.

## Temperature vs Carcass Grade

Carcass grades, like yield, indicates no variance due to temperature.

The effect of temperature on carcass grades appears insignificant. Nine lots decreased in grade from first to third day while temperatures varied from 19 degrees to 68 degrees fahrenheit.

This study indicates that the variance in yield or carcass grade cannot be attributed to difference in temperature.

## CHAPTER 10

## PRACTICAL IMPLICATIONS OF THE STUDY

This study of practical implications of carcass weight and grade marketing was based on primary data collected at a local packing plant. It involved the study of 17 lots of 54 lambs or a total of 918 lambs. These lambs were divided into three classifications: Western, Native and lambs from the packer's feedlot. The experiment was designed to study the reduction of yield and grade over a three day period.

Western lambs did not indicate any consistent pattern in yield or grade for the three day hold-over period. There was some indication that western lambs held two or three days after arriving at the packing plant would have a higher yield than those slaughtered immediately after arrival. Because of the lack of uniformity in this group no definite conclusions can be reached on the importance of yield and grade reductions.

Native lambs indicate a uniform pattern of yield and grade reductions during the hold-over period. Lambs held two or three days after arrival had lower yield and grade than those slaughtered the day of arrival. This decline of yield is not significant. Carcass grade is reduced significantly if lambs are held three days prior to slaughter.

Fed lambs do not indicate a uniform pattern. In this study the mean of all fed lambs indicated a decline from first to third day in yield and grade. The sample tested was however, too small to give conclusive evidence.

The primary purpose of the study was to determine how decline in yield and grade due to a three day hold-over period in packer's yard would influence returns to farmers under carcass grade and weight marketing.

Yield results indicate that as far as western lambs are concerned it would be difficult to make a price adjustment because of the lack of uniform pattern and behavior. Native lambs, on the other hand, did have a definite pattern but the decline in yield was not statistically significant.

Yield differences in the study were relatively small. Some inequities in payments to individual farmers would be made, but this would be of minor importance in carcass weight and grade marketing.

Carcass grade, although found significant on a one-third grade basis, would not be of practical importance in normal packing plant procedure which is on the basis of whole grades as described by the U. S. Department of Agriculture.

Temperature data indicated minor influence of temperature on loss of yield and grade. The distance and time intransit does have some apparent influence on yield of lambs.

Although not included in the purpose of this study, results indicate a significant relationship between quality of lambs and their yield. Better quality lambs yielded higher than low quality lambs.

## APPENDICES

A. Bibliography

B. Schedules and Forms

C. Primary Data

D. Analysis of Variance Data

# APPENDIX A

## BIBLIOGRAPHY

# BIBLIOGRAPHY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# APPENDIX B

## SCHEDULES AND FORMS

SUBLOT NO. 1

Date Weighted & Sorted_____
Date Slaughtered_____

| Grade 1 | Live Weight | Carcass Weight | Shrink | Yield | Carcass Grade |
|---|---|---|---|---|---|
| Tag No. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Average | | | | | |
| Grade 2 | | | | | |
| Tag No. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Average | | | | | |
| Grade 3- | | | | | |
| Tag No. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Average | | | | | |
| Totals for sublot | | | | | |
| Distance traveled | | | | | |
| Time in transit | | | | | |
| Temperature | | | | | |
| Feed in packer's yard | | | | | |

SUBLOT NO. 2

Date Weighted & Sorted_____
Date Slaughtered_____

| Grade 1 | Live Weight | Carcass Weight | Shrink | Yield | Carcass Grade |
|---|---|---|---|---|---|
| Tag No. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Average | | | | | |
| Grade 2 | | | | | |
| Tag No. | | | | | |
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| | | | | | |
| | | | | | |
| Average | | | | | |
| Grade 3- | | | | | |
| Tag No. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Average | | | | | |
| Totals for sublot | | | | | |
| Distance traveled | | | | | |
| Time in transit | | | | | |
| Temperature | | | | | |
| Feed in packer's yard | | | | | |

LOT NO. 8
SUBLOT NO. 3

Date Weighted & Sorted_____
Date Slaughtered_____

| Grade 1 | Live Weight | Carcass Weight | Shrink | Yield | Carcass Grade |
|---|---|---|---|---|---|
| Tag No. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Average | | | | | |
| Grade 2 | | | | | |
| Tag No. | | | | | |
| | | | | | |
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| | | | | | |
| | | | | | |
| | | | | | |
| Average | | | | | |
| Grade 3- | | | | | |
| Tag No. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Average | | | | | |
| Totals for sublot | | | | | |
| Distance traveled | | | | | |
| Time in transit | | | | | |
| Temperature | | | | | |
| Feed in packer's yard | | | | | |

# LAMB GRADING RESULTS

Date_____

| Tag Number | Carcass Weight | Grade |
|---|---|---|
| | | |
| | | |
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# APPENDIX C

## PRIMARY DATA

Item 1. Numerical Equivalents of Grades

Item 2. Individual Lot Data

Item 3. Total Lamb Data

ITEM 1.

Numerical Equivalents of Grades

Numerical Equivalents of Grades

| Carcass Grade | Number |
|---|---|
| Prime | 13 |
| Choice, plus | 12 |
| Choice | 11 |
| Choice, minus | 10 |
| Good, plus | 9 |
| Good | 8 |
| Good, minus | 7 |
| Commercial, plus | 6 |
| Commercial | 5 |
| Commercial, minus | 4 |
| Utility, plus | 3 |
| Utility | 2 |
| Utility, minus | 1 |
| Cull | 0 |

ITEM 2. - Individual Lot Data

Lot No. sample 2/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 1/ | | | | | | |
| 2 | | | | | | |
| 3 Individual lamb yields | | | | Individual lamb carcass | | |
| 4 in percentage | | | | grades | | |
| 5 | | | | | | |
| 6 | | | | | | |
| Sum of individual lambs by day (EX) | | | | | | |
| Mean of all lambs in this grouping by day ($\bar{X}$) | | | | | | |
| Sum of squares of individual lambs by day ($Ex^2$) | | | | | | |
| Grade 2 | | | | | | |
| 7 1/ | | | | | | |
| 8 | | | | | | |
| 9 Individual lamb yields | | | | | | |
| 10 in percentage | | | | Individual lamb carcass | | |
| 11 | | | | grades | | |
| 12 | | | | | | |
| Sum of individual lambs by day (EX) | | | | | | |
| Mean of all lambs in this grouping ($\bar{X}$) | | | | | | |
| Sum of squares of individual lambs by day ($Ex^2$) | | | | | | |
| Grade 3 | | | | | | |
| 13 1/ | | | | | | |
| 14 | | | | | | |
| 15 Individual lamb yields | | | | Individual lamb carcass | | |
| 16 in percentage | | | | grades | | |
| 17 | | | | | | |
| 18 | | | | | | |
| Sum of individual lambs by day (EX) | | | | | | |
| Mean of all lambs in this grouping by day ($\bar{X}$) | | | | | | |
| Sum of squares of individual lambs by day ($Ex^2$) | | | | | | |
| Sum of all lambs by day (EX) | | | | | | |
| Mean of all lambs by day ($\bar{X}$) | | | | | | |
| Sum of squares of individual lambs by day ($Ex^2$) | | | | | | |

1/ Tag numbers of individual lambs.

2/ This table has been set up to explain the data presented in the following 17 tables.

Lot No. 1 1/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 46.5 | 49.44 | 53.06 | 8 | 7 | 8 |
| 2 | 55.7 | 54.81 | 52.88 | 9 | 9 | 10 |
| 3 | 50.9 | 50.00 | 53.00 | 9 | 7 | 4 |
| 4 | 52.5 | 54.45 | 55.34 | 8 | 9 | 10 |
| 5 | 52.6 | 54.02 | 53.33 | 9 | 6 | 8 |
| 6 | 52.1 | 52.38 | 53.53 | 7 | 8 | 8 |
| | 310.3 | 315.10 | 321.14 | 50 | 46 | 48 |
| | 51.7 | 52.52 | 53.52 | 8.3 | 7.7 | 8.0 |
| | 16,092.97 | 16,575 | 17,192.7 | 420 | 360 | 408 |
| Grade 2 | | | | | | |
| 7 | 51.04 | 54 | 47.92 | 9 | 8 | 9 |
| 8 | 52.47 | 58.33 | 53.19 | 8 | 7 | 9 |
| 9 | 51.06 | 52.17 | 52.2 | 9 | 6 | 5 |
| 10 | 52.08 | 53.61 | 58.30 | 8 | 7 | 9 |
| 11 | 55.67 | 53.46 | 50.00 | 8 | 9 | 6 |
| 12 | 48.23 | 47.83 | 55.17 | 7 | 6 | 9 |
| | 310.55 | 319.4 | 316.8 | 49 | 43 | 46 |
| | 51.8 | 53.2 | 52.6 | 8.16 | 7.16 | 7.7 |
| | 16,102.9 | 17,059.8 | 16,792.9 | 403 | 315 | 368 |
| Grade 3 | | | | | | |
| 13 | 55.43 | 52.50 | 50.00 | 8 | 5 | 6 |
| 14 | 52.87 | 58.54 | 45.88 | 6 | 8 | 1 |
| 15 | 55.29 | 49.43 | 53.68 | 7 | 6 | 5 |
| 16 | 51.08 | 49.99 | 52.04 | 9 | 9 | 8 |
| 17 | 55.05 | 53.01 | 55.42 | 7 | 4 | 8 |
| 18 | 52.65 | 53.53 | 56.66 | 8 | 6 | 7 |
| | 327.4 | 316.5 | 313.7 | 45 | 38 | 35 |
| | 54.6 | 52.8 | 52.3 | 7.5 | 6.3 | 5.8 |
| | 17,887.9 | 16,751.3 | 16,476.4 | 343 | 258 | 239 |
| | 948.3 | 951 | 951.7 | 144 | 127 | 129 |
| | 52.7 | 52.8 | 52.9 | 7.99 | 7.02 | 7.26 |
| | 50,083.77 | 50,386.1 | 50,462. | 1,166 | 933 | 1,015 |

1/ See page 55 for table explanation.

## Lot No. 2 1/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 50 | 51.4 | 49.1 | 9 | 9 | 10 |
| 2 | 51.4 | 49.5 | 53.0 | 8 | 8 | 8 |
| 3 | 52.9 | 50.0 | 48.2 | 8 | 8 | 7 |
| 4 | 50. | 47.3 | 49.0 | 9 | 7 | 7 |
| 5 | 45.1 | 49.4 | 52.9 | 6 | 4 | 10 |
| 6 | 51.1 | 49.5 | 48.8 | 8 | 9 | 7 |
| | 300.5 | 297.1 | 301 | 48 | 45 | 49 |
| | 50.08 | 49.5 | 50.2 | 8.0 | 7.5 | 8.2 |
| | 15,085.6 | 14,720 | 15,123.9 | 390 | 355 | 411 |
| Grade 2 | | | | | | |
| 7 | 44.2 | 49.0 | 50.0 | 3 | 6 | 6 |
| 8 | 45.1 | 49.5 | 49.4 | 7 | 6 | 8 |
| 9 | 48.8 | 45.8 | 50.0 | 8 | 4 | 7 |
| 10 | 49.5 | 49 | 44.0 | 5 | 7 | 6 |
| 11 | 50.8 | 50.5 | 47.5 | 6 | 7 | 6 |
| 12 | 47 | 45.7 | 48.2 | 7 | 9 | 6 |
| | 285.4 | 289.5 | 289.1 | 36 | 39 | 39 |
| | 47.5 | 48.25 | 48.2 | 6.0 | 6.5 | 6.5 |
| | 13,609 | 13,988.6 | 13,955.9 | 232 | 267 | 257 |
| Grade 3 | | | | | | |
| 13 | 48.2 | 47.6 | 48.5 | 6 | 7 | 5 |
| 14 | 47.8 | 47.5 | 47.3 | 4 | 6 | 7 |
| 15 | 46.1 | 49.4 | 53.9 | 5 | 7 | 7 |
| 16 | 52.7 | 50.6 | 47.6 | 8 | 6 | 6 |
| 17 | 47.6 | 44.6 | 46.9 | 4 | 8 | 4 |
| 18 | 50.6 | 51.2 | 43.5 | 8 | 9 | 6 |
| | 293 | 290.9 | 287.7 | 35 | 43 | 35 |
| | 48.8 | 48.5 | 47.95 | 5.8 | 7.2 | 5.8 |
| | 14,336.7 | 14,133.3 | 13,852.4 | 221 | 315 | 211 |
| | 878.9 | 877.5 | 877.8 | 119 | 127 | 123 |
| | 48.8 | 48.75 | 48.75 | 6.6 | 7.07 | 6.8 |
| | 43,031.1 | 42,841.9 | 42,932.2 | 843 | 937 | 879 |

1/ See page 55 for table explanation.

Lot No. 3 1/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 51.1 | 50. | 47.4 | 9 | 8 | 6 |
| 2 | 45.7 | 49.5 | 50.6 | 8 | 9 | 9 |
| 3 | 52.9 | 51.4 | 55.5 | 9 | 9 | 9 |
| 4 | 53.7 | 50.0 | 45.7 | 8 | 10 | 7 |
| 5 | 51.3 | 50.5 | 48.6 | 10 | 9 | 9 |
| 6 | 52.6 | 45.8 | 50.0 | 9 | 9 | 9 |
| | 307.3 | 297.2 | 297.8 | 53 | 54 | 49 |
| | 51.2 | 49.5 | 49.6 | 8.8 | 9.0 | 8.2 |
| | 15,780.3 | 14,694.3 | 14,837.8 | 471 | 488 | 409 |
| Grade 2 | | | | | | |
| 7 | 48.8 | 49.4 | 49.4 | 8 | 8 | 9 |
| 8 | 52.5 | 48.9 | 50.9 | 9 | 7 | 8 |
| 9 | 55.6 | 50.6 | 50.0 | 9 | 7 | 7 |
| 10 | 51.7 | 49.4 | 52.4 | 8 | 7 | 9 |
| 11 | 48.6 | 45.5 | 46.9 | 8 | 4 | 4 |
| 12 | 50.5 | 47.7 | 45.7 | 9 | 4 | 6 |
| | 307.7 | 291.5 | 295.3 | 51 | 37 | 43 |
| | 51.3 | 48.6 | 49.2 | 8.5 | 6.2 | 7.2 |
| | 15,814.2 | 14,177.8 | 14,565 | 435 | 243 | 327 |
| Grade 3 | | | | | | |
| 13 | 52.6 | 45.8 | 45.8 | 9 | 6 | 6 |
| 14 | 49.4 | 51.7 | 45.5 | 6 | 11 | 5 |
| 15 | 47 | 49.5 | 46.1 | 8 | 9 | 6 |
| 16 | 50.6 | 48.3 | 45.6 | 6 | 6 | 7 |
| 17 | 51.6 | 53.5 | 46.7 | 8 | 6 | 8 |
| 18 | 56.3 | 50.0 | 44.7 | 6 | 3 | 7 |
| | 307.5 | 298.8 | 274.4 | 43 | 41 | 39 |
| | 51.3 | 49.8 | 45.7 | 7.2 | 6.8 | 6.5 |
| | 15,808.7 | 14,915.9 | 12,551.4 | 317 | 319 | 259 |
| | 922.5 | 887.5 | 867.5 | 147 | 132 | 131 |
| | 51.3 | 49.3 | 48.2 | 8.2 | 7.3 | 7.3 |
| | 47,403.2 | 43,788. | 41,954.2 | 1,223 | 1,050 | 995 |

1/ See page 55 for table explanation.

Lot No. 4 1/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 53.4 | 64.8 | 62.5 | 9 | 10 | 9 |
| 2 | 54.3 | 60.8 | 66.0 | 9 | 9 | 9 |
| 3 | 54.0 | 56.6 | 50.6 | 11 | 9 | 6 |
| 4 | 53.8 | 49.5 | 51.9 | 10 | 9 | 6 |
| 5 | 54.4 | 56.3 | 57.6 | 9 | 9 | 11 |
| 6 | 53.8 | 55.4 | 54.1 | 9 | 9 | 6 |
| | 323.7 | 343.4 | 342.7 | 57 | 55 | 47 |
| | 54 | 57.2 | 57.1 | 9.5 | 9.2 | 7.8 |
| | 17,464.3 | 19,788.4 | 19,760.8 | 545 | 505 | 391 |
| Grade 2 | | | | | | |
| 7 | 51.7 | 54.0 | 58.7 | 9 | 6 | 9 |
| 8 | 52.7 | 47.9 | 55.0 | 8 | 3 | 10 |
| 9 | 51.5 | 64.4 | 53.3 | 8 | 10 | 7 |
| 10 | 43.8 | 57.6 | 55.1 | 8 | 8 | 9 |
| 11 | 53.8 | 59.8 | 51.0 | 9 | 8 | 6 |
| 12 | 52.4 | 52.9 | 51.5 | 7 | 9 | 6 |
| | 305.9 | 336.6 | 324.6 | 49 | 44 | 47 |
| | 51.0 | 56.1 | 54.1 | 8.2 | 7.3 | 7.8 |
| | 15,661 | 19,049.9 | 17,600.8 | 403 | 354 | 383 |
| Grade 3 | | | | | | |
| 13 | 50.6 | 52.4 | 54.0 | 7 | 8 | 6 |
| 14 | 54.3 | 63.8 | 54.5 | 6 | 7 | 6 |
| 15 | 48.1 | 60.9 | 48.8 | 5 | 7 | 4 |
| 16 | 50.0 | 57.9 | 52.7 | 4 | 5 | 9 |
| 17 | 46.5 | 47.6 | 48.9 | 6 | 2 | 2 |
| 18 | 52.3 | 56.3 | 48.9 | 7 | 8 | 5 |
| | 301.8 | 338.9 | 307.8 | 35 | 37 | 32 |
| | 50.3 | 56.5 | 51.3 | 5.8 | 6.2 | 5.3 |
| | 15,220 | 19,312.9 | 15,827.4 | 211 | 255 | 198 |
| | 931.4 | 1,018.9 | 975.1 | 141 | 136 | 126 |
| | 51.8 | 56.6 | 54.2 | 7.8 | 7.6 | 6.8 |
| | 48,345.3 | 58,151.2 | 53,189 | 1,159 | 1,114 | 972 |

1/ See page 55 for table explanation.

Lot No. 5 1/

| Grade | Yield Day 1 | Yield Day 2 | Yield Day 3 | Grade Day 1 | Grade Day 2 | Grade Day 3 |
|---|---|---|---|---|---|---|
| 1 | 57.1 | 59.0 | 56.8 | 8 | 8 | 7 |
| 2 | 54.1 | 36.2 | 55.3 | 9 | 7 | 9 |
| 3 | 53.6 | 54.3 | 52.4 | 7 | 7 | 7 |
| 4 | 54.1 | 52.5 | 54.9 | 8 | 7 | 8 |
| 5 | 50.0 | 53.9 | 52.5 | 7 | 9 | 5 |
| 6 | 57.9 | 56.4 | 58.5 | 9 | 8 | 9 |
| | 326.8 | 312.3 | 330.4 | 48 | 46 | 45 |
| | 54.5 | 52.1 | 55.1 | 8.0 | 7.7 | 7.5 |
| | 17,839.4 | 16,582.4 | 18,222.6 | 388 | 356 | 349 |
| **Grade 2** | | | | | | |
| 7 | 60.9 | 53.4 | 53.8 | 8 | 7 | 7 |
| 8 | 53.6 | 52.5 | 58.1 | 9 | 8 | 9 |
| 9 | 53.4 | 51.3 | 52.2 | 8 | 6 | 6 |
| 10 | 51.6 | 55.8 | 53.7 | 7 | 8 | 6 |
| 11 | 54.4 | 54.3 | 54.1 | 10 | 9 | 7 |
| 12 | 53.7 | 52.0 | 59.3 | 8 | 5 | 8 |
| | 327.6 | 319.3 | 331.2 | 50 | 43 | 43 |
| | 54.6 | 53.2 | 55.2 | 8.3 | 7.2 | 7.2 |
| | 17,938.9 | 17,005.6 | 18,321.9 | 422 | 319 | 315 |
| **Grade 3** | | | | | | |
| 13 | 42.6 | 58.2 | 61.6 | 8 | 5 | 8 |
| 14 | 48.0 | 54.4 | 61.3 | 6 | 7 | 9 |
| 15 | 45.4 | 50.0 | 52.5 | 6 | 3 | 6 |
| 16 | 55.9 | 50.0 | 54.9 | 7 | 3 | 7 |
| 17 | 47.0 | 51.2 | 57.0 | 8 | 7 | 6 |
| 18 | 53.4 | 55.2 | 54.7 | 6 | 7 | 7 |
| | 292.3 | 319 | 342 | 41 | 32 | 43 |
| | 48.7 | 53.2 | 57 | 6.8 | 5.3 | 7.2 |
| | 14,365.3 | 19,563.7 | 17,015.1 | 285 | 190 | 315 |
| | 946.7 | 950.6 | 1,003.6 | 139 | 121 | 131 |
| | 52.6 | 52.8 | 55.8 | 7.7 | 6.7 | 7.3 |
| | 50,143.6 | 53,151.7 | 53,559.6 | 1,095 | 865 | 979 |

1/ See page 55 for table explanation.

Lot No. 6 1/

| | YIELD Day | | | GRADE Day | | |
|---|---|---|---|---|---|---|
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 47.7 | 46.7 | 52.8 | 8 | 9 | 8 |
| 2 | 47.8 | 45.8 | 49.0 | 9 | 7 | 8 |
| 3 | 49.5 | 47.5 | 50.0 | 9 | 7 | 11 |
| 4 | 49.4 | 51.6 | 47.3 | 7 | 8 | 8 |
| 5 | 53.0 | 51.0 | 51.6 | 8 | 7 | 7 |
| 6 | 50.5 | 47.5 | 54.8 | 8 | 7 | 9 |
| | 297.9 | 290.1 | 305.5 | 49 | 45 | 51 |
| | 49.7 | 48.4 | 50.9 | 8.1 | 7.5 | 8.5 |
| | 14,810 | 14,054.6 | 15,591.7 | 403 | 341 | 443 |
| Grade 2 | | | | | | |
| 7 | 47.3 | 51.9 | 51.3 | 5 | 4 | 7 |
| 8 | 48.3 | 47.4 | 46.7 | 8 | 6 | 5 |
| 9 | 49.5 | 50.5 | 48.0 | 7 | 8 | 6 |
| 10 | 46.7 | 49.5 | 52.0 | 4 | 7 | 8 |
| 11 | 47.1 | 48.0 | 47.1 | 9 | 6 | 7 |
| 12 | 48.9 | 48.3 | 47.7 | 7 | 8 | 6 |
| | 287.8 | 295.6 | 292.8 | 40 | 39 | 39 |
| | 47.96 | 49.3 | 48.8 | 6.7 | 6.5 | 6.5 |
| | 13,810.9 | 14,577.8 | 14,314.3 | 284 | 265 | 259 |
| Grade 3 | | | | | | |
| 13 | 46.8 | 56.2 | 52.0 | 6 | 8 | 9 |
| 14 | 48.1 | 50.0 | 49.4 | 8 | 7 | 7 |
| 15 | 53.6 | 51.3 | 50.6 | 7 | 7 | 7 |
| 16 | 44.8 | 47.6 | 48.8 | 5 | 4 | 8 |
| 17 | 45.4 | 48.8 | 47.5 | 6 | 6 | 5 |
| 18 | 51.6 | 47.3 | 52.9 | 8 | 8 | 5 |
| | 290.3 | 301.2 | 301.2 | 40 | 40 | 41 |
| | 49.4 | 50.2 | 50.2 | 6.7 | 6.7 | 6.8 |
| | 14,107.6 | 15,174.6 | 15,140.8 | 274 | 278 | 293 |
| | 876 | 886.9 | 899.5 | 129 | 124 | 131 |
| | 49 | 49.3 | 49.9 | 7.2 | 6.9 | 7.3 |
| | 42,728.5 | 43,807 | 45,046.8 | 961 | 884 | 995 |

1/ See page 55 for table explanation.

Lot No. 7 1/

| Grade 1 | YIELD Day 1 | YIELD Day 2 | YIELD Day 3 | GRADE Day 1 | GRADE Day 2 | GRADE Day 3 |
|---|---|---|---|---|---|---|
| 1 | 52.8 | 52.0 | 50.0 | 6 | 4 | 7 |
| 2 | 51.1 | 56.0 | 52.6 | 6 | 6 | 8 |
| 3 | 51.6 | 52.8 | 53.9 | 8 | 7 | 6 |
| 4 | 53.7 | 51.1 | 53.4 | 7 | 7 | 7 |
| 5 | 51.6 | 54.2 | 51.5 | 7 | 9 | 5 |
| 6 | 53.1 | 56.0 | 54.3 | 6 | 7 | 9 |
| | 313.9 | 322.1 | 315.7 | 40 | 40 | 42 |
| | 52.3 | 53.7 | 52.6 | 6.7 | 6.7 | 7.0 |
| | 16,427.5 | 17,312.7 | 16,624.3 | 270 | 280 | 304 |
| **Grade 2** | | | | | | |
| 7 | 50.0 | 54.9 | 50.5 | 8 | 7 | 4 |
| 8 | 52.9 | 50.9 | 54.4 | 7 | 7 | 8 |
| 9 | 51.6 | 54.2 | 53.9 | 6 | 7 | 6 |
| 10 | 52.8 | 53.1 | 52.3 | 6 | 7 | 5 |
| 11 | 52.3 | 51.3 | 51.0 | 7 | 8 | 4 |
| 12 | 55.6 | 52.3 | 57.0 | 8 | 8 | 9 |
| | 315.2 | 316.7 | 319.1 | 42 | 44 | 36 |
| | 52.5 | 52.8 | 53.2 | 7.0 | 7.3 | 6.0 |
| | 16,575.5 | 16,729 | 17,000.1 | 298 | 324 | 238 |
| **Grade 3** | | | | | | |
| 13 | 54.1 | 49.4 | 50.6 | 7 | 5 | 7 |
| 14 | 52.5 | 53.8 | 50.6 | 4 | 8 | 5 |
| 15 | 51.3 | 47.6 | 50.6 | 6 | 6 | 6 |
| 16 | 53.0 | 51.7 | 53.6 | 8 | 8 | 5 |
| 17 | 48.3 | 51.3 | 50.5 | 6 | 5 | 7 |
| 18 | 52.0 | 56.4 | 53.1 | 8 | 6 | 7 |
| | 311.2 | 310.2 | 309 | 39 | 38 | 37 |
| | 51.7 | 52.7 | 51.5 | 6.5 | 6.3 | 6.2 |
| | 16,160.6 | 16,086.1 | 15,923.9 | 265 | 250 | 233 |
| | 940.3 | 949 | 943.8 | 121 | 122 | 115 |
| | 52.2 | 53.2 | 52.4 | 6.8 | 6.8 | 6.4 |
| | 49,163.6 | 50,127.8 | 49,548.3 | 833 | 854 | 775 |

1/ See page 55 for table explanation.

Lot No. 8 1/

| Grade 1 | YIELD Day 1 | YIELD Day 2 | YIELD Day 3 | GRADE Day 1 | GRADE Day 2 | GRADE Day 3 |
|---|---|---|---|---|---|---|
| 1 | 51.0 | 49.5 | 47.3 | 9 | 7 | 7 |
| 2 | 47.7 | 48.1 | 52.6 | 4 | 9 | 9 |
| 3 | 47.0 | 48.6 | 47.5 | 7 | 7 | 9 |
| 4 | 50.5 | 50.0 | 46.9 | 9 | 6 | 5 |
| 5 | 49.6 | 51.0 | 45.4 | 6 | 9 | 4 |
| 6 | 48.0 | 51.0 | 54.4 | 8 | 8 | 7 |
| | 293.8 | 298.2 | 294.1 | 43 | 46 | 41 |
| | 49.0 | 49.7 | 49.0 | 7.2 | 7.7 | 6.8 |
| | 14,399.7 | 14,827.8 | 14,480.4 | 327 | 360 | 301 |
| **Grade 2** | | | | | | |
| 7 | 45.6 | 46.5 | 42.5 | 5 | 6 | 7 |
| 8 | 47.2 | 45.5 | 50.5 | 6 | 6 | 8 |
| 9 | 48.5 | 48.5 | 51.0 | 6 | 7 | 7 |
| 10 | 47.4 | 50.4 | 49.5 | 7 | 6 | 6 |
| 11 | 49.5 | 48.0 | 48.7 | 9 | 4 | 4 |
| 12 | 50.0 | 52.8 | 54.5 | 8 | 6 | 7 |
| | 288.2 | 291.7 | 296.7 | 41 | 35 | 39 |
| | 48.0 | 48.6 | 49.5 | 6.8 | 5.8 | 6.5 |
| | 13,856.5 | 14,216.7 | 14,749.69 | 291 | 209 | 263 |
| **Grade 3** | | | | | | |
| 13 | 50.5 | 48.5 | 46.9 | 6 | 8 | 5 |
| 14 | 49.5 | 48.9 | 51.0 | 7 | 7 | 6 |
| 15 | 49.5 | 52.7 | 47.9 | 5 | 7 | 5 |
| 16 | 49.5 | 46.7 | 49.1 | 6 | 5 | 5 |
| 17 | 50.7 | 47.3 | 47.5 | 6 | 6 | 6 |
| 18 | 47.9 | 53.5 | 43.1 | 7 | 7 | 4 |
| | 297.8 | 297.6 | 285.7 | 37 | 40 | 31 |
| | 49.6 | 49.6 | 47.6 | 6.2 | 6.7 | 5.2 |
| | 14,786.2 | 14,801.2 | 13,637 | 231 | 272 | 163 |
| | 879.8 | 887.5 | 876.5 | 121 | 121 | 111 |
| | 48.9 | 49.3 | 48.7 | 6.8 | 6.8 | 6.2 |
| | 43,042.4 | 43,845.7 | 42,867.1 | 849 | 841 | 727 |

1/ See page 55 for table explanation.

Lot. No. 9 1/

| Grade 1 | YIELD Day 1 | YIELD Day 2 | YIELD Day 3 | GRADE Day 1 | GRADE Day 2 | GRADE Day 3 |
|---|---|---|---|---|---|---|
| 1 | 51.9 | 53.2 | 41.9 | 6 | 8 | 9 |
| 2 | 52.7 | 48.2 | 55.5 | 9 | 8 | 8 |
| 3 | 50.8 | 50.6 | 53.7 | 7 | 9 | 9 |
| 4 | 47.1 | 54.4 | 52.9 | 8 | 11 | 6 |
| 5 | 48.9 | 58.5 | 51.6 | 8 | 11 | 10 |
| 6 | 55.1 | 65.4 | 53.2 | 8 | 11 | 9 |
| | 306.5 | 330.3 | 308.8 | 46 | 58 | 51 |
| | 51.1 | 55.1 | 51.5 | 7.7 | 9.7 | 8.5 |
| | 15,697.2 | 18,372.7 | 16,010.7 | 358 | 572 | 443 |
| **Grade 2** | | | | | | |
| 7 | 48.8 | 51.4 | 66.7 | 6 | 5 | 6 |
| 8 | 45.2 | 51.4 | 46.7 | 6 | 9 | 9 |
| 9 | 49.4 | 50.0 | 49.0 | 6 | 8 | 5 |
| 10 | 54.1 | 47.3 | 49.3 | 8 | 7 | 8 |
| 11 | 53.3 | 50.6 | 55.6 | 7 | 9 | 5 |
| 12 | 50.7 | 50.6 | 50.0 | 8 | 5 | 6 |
| | 301.5 | 301.3 | 317.3 | 41 | 43 | 39 |
| | 50.3 | 50.2 | 52.9 | 6.8 | 7.2 | 6.5 |
| | 15,203 | 15,141.9 | 12,603.7 | 285 | 325 | 267 |
| **Grade 3** | | | | | | |
| 13 | 52.6 | 47.9 | 50.0 | 7 | 3 | 7 |
| 14 | 50.0 | 46.3 | 44.4 | 5 | 4 | 1 |
| 15 | 69.6 | 47.3 | 51.8 | 8 | 2 | 8 |
| 16 | 47.7 | 49.4 | 43.5 | 6 | 5 | 5 |
| 17 | 50.7 | 52.2 | 44.7 | 4 | 5 | 5 |
| 18 | 47.4 | 48.1 | 50.0 | 7 | 1 | 7 |
| | 318 | 291.2 | 284.4 | 37 | 20 | 33 |
| | 53 | 48.5 | 47.4 | 6.2 | 3.3 | 5.5 |
| | 17,203.5 | 14,154.2 | 13,544.9 | 239 | 80 | 213 |
| | 926 | 922.8 | 910.5 | 124 | 121 | 123 |
| | 51.4 | 51.3 | 50.6 | 6.9 | 6.7 | 6.8 |
| | 48,103.7 | 47,668.8 | 46,608.2 | 882 | 977 | 923 |

1/ See page 55 for table explanation.

## Lot No. 10 1/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 55.0 | 54.9 | 36.0 | 9 | 9 | 6 |
| 2 | 49.5 | 51.6 | 49.4 | 6 | 7 | 9 |
| 3 | 52.8 | 51.5 | 47.9 | 8 | 8 | 8 |
| 4 | 51.0 | 51.6 | 51.5 | 7 | 7 | 9 |
| 5 | 54.0 | 50.0 | 48.3 | 10 | 7 | 8 |
| 6 | 56.4 | 52.7 | 50.0 | 9 | 9 | 9 |
| | 318.7 | 312.3 | 283.1 | 49 | 47 | 49 |
| | 53.1 | 52 | 47.2 | 8.2 | 7.8 | 8.2 |
| | 16,961 | 16,268.7 | 13,515.9 | 411 | 373 | 407 |
| Grade 2 | | | | | | |
| 7 | 51.5 | 50.0 | 51.1 | 7 | 7 | 9 |
| 8 | | 51.0 | 52.0 | 8 | 7 | 9 |
| 9 | 54.4 | 51.2 | 49.5 | 8 | 5 | 8 |
| 10 | 51.6 | 49.0 | 48.2 | 8 | 7 | 6 |
| 11 | 47.9 | 51.9 | 51.0 | 7 | 6 | 6 |
| 12 | 50.5 | 55.5 | 51.8 | 7 | 9 | 7 |
| | 308.8 | 308.6 | 303.6 | 45 | 41 | 45 |
| | 51.5 | 51.4 | 50.6 | 7.5 | 6.8 | 7.5 |
| | 15,917.2 | 15,897.3 | 15,372.9 | 339 | 289 | 347 |
| Grade 3 | | | | | | |
| 13 | 53.6 | 52.5 | 53.4 | 5 | 8 | 8 |
| 14 | 49.4 | 49.5 | 48.5 | 8 | 6 | 7 |
| 15 | 50.5 | 51.8 | 51.2 | 6 | 9 | 9 |
| 16 | 50.3 | 50.9 | 67.0 | 7 | 7 | 9 |
| 17 | 53.4 | 43.5 | 45.8 | 8 | 5 | 7 |
| 18 | 50.5 | 50.0 | 48.3 | 8 | 7 | 9 |
| | 307.9 | 298.2 | 314.2 | 42 | 42 | 49 |
| | 51.3 | 49.7 | 52.4 | 7 | 7 | 8.2 |
| | 15,815.6 | 14,872.8 | 16,744.8 | 302 | 304 | 405 |
| | 934.5 | 919.1 | 900.9 | 136 | 130 | 143 |
| | 51.9 | 51 | 50.0 | 7.6 | 7.2 | 7.96 |
| | 48,693.8 | 47,038.8 | 45,633.6 | 1,052 | 966 | 1,159 |

1/ See table 55 for table explanation.

## Lot No. 11 1/

| Grade | YIELD Day 1 | Day 2 | Day 3 | GRADE Day 1 | Day 2 | Day 3 |
|---|---|---|---|---|---|---|
| 1 | 53.6 | 49.0 | 42.5 | 8 | 6 | 3 |
| 2 | 51.2 | 54.8 | 47.3 | 10 | 10 | 5 |
| 3 | 54.9 | 50.0 | 56.0 | 9 | 6 | 9 |
| 4 | 53.3 | 50.0 | 46.6 | 9 | 9 | 5 |
| 5 | 55.0 | 55.4 | 47.1 | 9 | 9 | 6 |
| 6 | 45.8 | 46.0 | 48.2 | 5 | 4 | 6 |
| | 313.8 | 305.2 | 287.7 | 50 | 44 | 34 |
| | 52.3 | 50.9 | 47.9 | 8.3 | 7.3 | 5.7 |
| | 16,471.9 | 15,589.2 | 13,892.7 | 432 | 350 | 212 |
| **Grade 2** | | | | | | |
| 7 | 48.4 | 47.0 | 45.1 | 8 | 6 | 5 |
| 8 | 48.3 | 47.6 | 46.0 | 6 | 4 | 3 |
| 9 | 51.0 | 43.3 | 48.5 | 9 | 6 | 6 |
| 10 | 48.8 | 50.6 | 49.4 | 8 | 8 | 6 |
| 11 | 47.2 | 50.8 | 42.8 | 2 | 7 | 6 |
| 12 | 47.7 | 43.2 | 49.5 | 7 | 5 | 6 |
| | 291.4 | 282.5 | 281.3 | 40 | 36 | 32 |
| | 48.6 | 47.1 | 46.9 | 6.7 | 6 | 5.3 |
| | 14,161 | 13,356.9 | 13,224.7 | 298 | 226 | 178 |
| **Grade 3** | | | | | | |
| 13 | 47.0 | 47.8 | 46.7 | 7 | 6 | 6 |
| 14 | 46.4 | 47.7 | 43.8 | 6 | 6 | 5 |
| 15 | 47.7 | 46.4 | 46.9 | 6 | 6 | 6 |
| 16 | 44.7 | 48.7 | 46.1 | 3 | 6 | 4 |
| 17 | 54.5 | 51.3 | 42.6 | 9 | 6 | 3 |
| 18 | 51.3 | 48.8 | 50.0 | 6 | 3 | 8 |
| | 291.6 | 290.7 | 276.1 | 37 | 33 | 32 |
| | 48.6 | 48.4 | 46 | 6.2 | 5.5 | 5.3 |
| | 14,237.3 | 14,097.9 | 12,738.9 | 247 | 189 | 186 |
| | 896.8 | 878.4 | 845.1 | 127 | 113 | 98 |
| | 49.8 | 48.8 | 46.9 | 7.2 | 6.3 | 5.4 |
| | 44,870.2 | 43,044 | 39,856.3 | 977 | 765 | 576 |

1/ See page 55 for table explanation.

Lot No. 12 1/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 53.5 | 55.4 | 56.0 | 9 | 10 | 6 |
| 2 | 67.5 | 52.3 | 48.1 | 11 | 9 | 6 |
| 3 | 52.8 | 52.2 | 54.1 | 9 | 7 | 9 |
| 4 | 55.8 | 58.6 | 53.5 | 12 | 9 | 7 |
| 5 | 50.5 | 52.2 | 54.5 | 9 | 8 | 10 |
| 6 | 53.6 | 51.5 | 55.3 | 9 | 9 | 11 |
| | 333.7 | 322.2 | 321.5 | 59 | 52 | 49 |
| | 55.6 | 53.7 | 53.6 | 9.8 | 8.7 | 8.2 |
| | 14,186.9 | 17,340.3 | 17,267 | 589 | 456 | 423 |
| Grade 2 | | | | | | |
| 7 | 46.2 | 52.0 | 59.0 | 7 | 7 | 9 |
| 8 | 49.5 | 50.0 | 60.8 | 5 | 4 | 8 |
| 9 | 55.4 | 51.1 | 55.2 | 9 | 8 | 4 |
| 10 | 51.7 | 45.8 | 42.8 | 7 | 7 | 7 |
| 11 | 57.1 | 54.1 | 52.6 | 9 | 8 | 6 |
| 12 | 49.5 | 45.2 | 47.8 | 7 | 3 | 5 |
| | 309.4 | 298.2 | 318.2 | 44 | 37 | 39 |
| | 51.6 | 49.7 | 53.1 | 7.3 | 6.2 | 6.5 |
| | 16,037.4 | 14,882.7 | 13,411.5 | 334 | 251 | 271 |
| Grade 3 | | | | | | |
| 13 | 52.8 | 51.1 | 48.1 | 6 | 8 | 6 |
| 14 | 55.8 | 50.6 | 39.3 | 9 | 6 | 2 |
| 15 | 49.0 | 52.4 | 52.3 | 9 | 6 | 6 |
| 16 | 47.6 | 44.4 | 51.8 | 6 | 4 | 8 |
| 17 | 51.2 | 56.5 | 44.1 | 5 | 9 | 5 |
| 18 | 52.3 | 51.8 | 47.5 | 9 | 8 | 7 |
| | 308.7 | 306.8 | 283.1 | 44 | 41 | 34 |
| | 51.4 | 51.1 | 47.2 | 7.3 | 6.8 | 5.7 |
| | 15,925 | 15,764.2 | 13,477.7 | 340 | 297 | 212 |
| | 951.8 | 927.2 | 922.8 | 147 | 130 | 122 |
| | 52.9 | 51.5 | 51.3 | 8.1 | 7.2 | 6.8 |
| | 50,705.6 | 47,987.2 | 47,852.8 | 1,263 | 1,004 | 906 |

1/ See page 55 for table explanation.

Lot No. 13 1/

| Grade 1 | YIELD Day 1 | Day 2 | Day 3 | GRADE Day 1 | Day 2 | Day 3 |
|---|---|---|---|---|---|---|
| 1 | 49.4 | 49.4 | 49.5 | 7 | 8 | 10 |
| 2 | 48.9 | 47.4 | 49.5 | 7 | 5 | 3 |
| 3 | 46.2 | 53.7 | 49.0 | 7 | 9 | 7 |
| 4 | 52.3 | 47.2 | 47.4 | 8 | 9 | 6 |
| 5 | 50.0 | 48.9 | 50.0 | 9 | 9 | 7 |
| 6 | 47.2 | 51.5 | 49.6 | 8 | 7 | 7 |
| | 294 | 298.1 | 295 | 46 | 49 | 40 |
| | 49 | 49.7 | 49.2 | 7.7 | 8.2 | 6.7 |
| | 14,419.7 | 14,842 | 14,508.4 | 356 | 381 | 292 |
| **Grade 2** | | | | | | |
| 7 | 46.7 | 52.4 | 50.0 | 5 | 3 | 7 |
| 8 | 47.7 | 46.1 | 49.5 | 7 | 6 | 8 |
| 9 | 51.5 | 51.0 | 49.4 | 6 | 8 | 8 |
| 10 | 51.7 | 47.9 | 52.3 | 4 | 6 | 7 |
| 11 | 51.2 | 47.5 | 52.1 | 6 | 6 | 9 |
| 12 | 51.2 | 46.9 | 47.9 | 8 | 6 | 7 |
| | 300.3 | 291.8 | 301.2 | 36 | 35 | 46 |
| | 50.5 | 48.6 | 50.2 | 6 | 5.8 | 7.7 |
| | 15,024.2 | 14,222.2 | 15,134.7 | 226 | 217 | 356 |
| **Grade 3** | | | | | | |
| 13 | 50.0 | 47.4 | 46.6 | 6 | 6 | 7 |
| 14 | 48.0 | 48.0 | 46.1 | 8 | 8 | 6 |
| 15 | 43.5 | 52.4 | 48.3 | 5 | 8 | 7 |
| 16 | 53.8 | 48.8 | 46.1 | 5 | 6 | 7 |
| 17 | 48.1 | 46.7 | 49.0 | 5 | 5 | 6 |
| 18 | 51.2 | 47.4 | 50.0 | 8 | 5 | 8 |
| | 294.6 | 290.7 | 286.1 | 37 | 38 | 41 |
| | 49.1 | 48.4 | 47.7 | 6.2 | 6.3 | 6.8 |
| | 14,525.7 | 14,105.6 | 13,655.9 | 239 | 250 | 283 |
| | 888.6 | 880.6 | 882.3 | 119 | 122 | 127 |
| | 49.4 | 48.9 | 49 | 6.6 | 6.8 | 7.1 |
| | 43,969.6 | 43,169.8 | 43,299 | 821 | 848 | 931 |

1/ See page 55 for table explanation.

Lot No. 14 1/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 58.0 | 53.2 | 49.5 | 8 | 7 | 7 |
| 2 | 52.8 | 51.6 | 53.0 | 9 | 6 | 10 |
| 3 | 52.3 | 50.9 | 52.2 | 9 | 8 | 8 |
| 4 | 48.9 | 53.4 | 48.4 | 7 | 7 | 8 |
| 5 | 46.1 | 48.3 | 50.0 | 5 | 6 | 8 |
| 6 | 49.5 | 51.8 | 47.6 | 8 | 8 | 5 |
| | 307.6 | 309.2 | 300.7 | 46 | 42 | 46 |
| | 51.3 | 51.5 | 50.1 | 7.7 | 7 | 7.7 |
| | 15,853.8 | 15,951.3 | 15,092.4 | 364 | 298 | 366 |
| Grade 2 | | | | | | |
| 7 | 57.8 | 48.7 | 44.9 | 6 | 5 | 3 |
| 8 | 47.4 | 48.9 | 48.8 | 5 | 8 | 6 |
| 9 | 52.2 | 52.8 | 50.0 | 8 | 6 | 9 |
| 10 | 45.3 | 51.7 | 49.5 | 7 | 6 | 7 |
| 11 | 54.9 | 49.4 | 55.3 | 7 | 9 | 9 |
| 12 | 44.9 | 50.0 | 46.8 | 6 | 7 | 5 |
| | 302.5 | 301.5 | 295.3 | 39 | 41 | 39 |
| | 50.4 | 50.2 | 49.2 | 6.5 | 6.8 | 6.5 |
| | 15,394.5 | 15,164 | 14,596 | 259 | 291 | 281 |
| Grade 3 | | | | | | |
| 13 | 46.2 | 50.0 | 46.3 | 5 | 4 | 6 |
| 14 | 47.4 | 47.4 | 46.7 | 4 | 5 | 5 |
| 15 | 50.0 | 46.7 | 44.9 | 8 | 5 | 6 |
| 16 | 54.2 | 51.9 | 46.1 | 8 | 7 | 2 |
| 17 | 52.3 | 54.6 | 46.1 | 6 | 6 | 5 |
| 18 | 45.7 | 45.2 | 46.1 | 4 | 5 | 3 |
| | 295.8 | 295.8 | 276.2 | 35 | 32 | 27 |
| | 49.3 | 49.3 | 46 | 5.8 | 5.3 | 4.5 |
| | 14,642.6 | 14,645.5 | 12,716.2 | 230 | 176 | 135 |
| | 905.9 | 906.5 | 872.2 | 120 | 115 | 112 |
| | 50.3 | 50.3 | 48.4 | 6.7 | 6.4 | 6.2 |
| | 45,890.9 | 45,760.8 | 42,404.6 | 853 | 765 | 782 |

1/ See page 55 for table explanation.

## Lot No. 15 1/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 52.9 | 53.5 | 48.1 | 8 | 9 | 5 |
| 2 | 52.6 | 57.3 | 48.3 | 8 | 8 | 7 |
| 3 | 50.8 | 52.1 | 52.0 | 8 | 6 | 8 |
| 4 | 53.2 | 52.0 | 51.4 | 8 | 7 | 6 |
| 5 | 53.1 | 51.5 | 51.6 | 9 | 8 | 7 |
| 6 | 50.5 | 49.6 | 50.5 | 6 | 7 | 8 |
| | 313.1 | 316 | 301.9 | 47 | 45 | 41 |
| | 52.2 | 52.7 | 50.3 | 7.8 | 7.5 | 6.8 |
| | 16,345.9 | 16,676.4 | 15,205.3 | 373 | 343 | 287 |
| Grade 2 | | | | | | |
| 7 | 50.0 | 47.4 | 55.7 | 6 | 6 | 8 |
| 8 | 52.4 | 47.8 | 47.9 | 6 | 6 | 4 |
| 9 | 51.9 | 55.2 | 50.0 | 8 | 5 | 7 |
| 10 | 51.5 | 50.0 | 54.2 | 9 | 7 | 8 |
| 11 | 48.2 | 47.8 | 46.1 | 9 | 7 | 3 |
| 12 | 52.1 | 52.2 | 50.7 | 7 | 9 | 5 |
| | 306.1 | 299.6 | 304.6 | 45 | 40 | 35 |
| | 51 | 49.9 | 50.8 | 7.5 | 6.7 | 5.8 |
| | 15,629.3 | 15,012.5 | 15,530.2 | 347 | 276 | 227 |
| Grade 3 | | | | | | |
| 13 | 50.6 | 52.4 | 48.3 | 6 | 8 | 4 |
| 14 | 53.9 | 46.0 | 47.0 | 6 | 4 | 5 |
| 15 | 53.0 | 48.4 | 48.5 | 6 | 6 | 2 |
| 16 | 51.8 | 48.0 | 50.0 | 7 | 5 | 6 |
| 17 | 50.6 | 53.1 | 49.0 | 8 | 6 | 6 |
| 18 | 48.9 | 50.0 | 50.0 | 5 | 6 | 5 |
| | 308.8 | 297.9 | 292.8 | 38 | 35 | 28 |
| | 51.5 | 49.6 | 48.8 | 6.3 | 5.8 | 4.7 |
| | 15,909.4 | 14,827.9 | 14,295.1 | 246 | 213 | 142 |
| | 928 | 913.5 | 899.3 | 130 | 120 | 104 |
| | 51.6 | 50.7 | 49.9 | 7.2 | 6.7 | 5.8 |
| | 47,884.6 | 46,516.8 | 45,030.6 | 966 | 832 | 656 |

1/ See page 55 for table explanation.

## Lot No. 16 1/

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | Day | | | Day | | |
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 53.1 | 50.9 | 50.5 | 10 | 7 | 7 |
| 2 | 51.7 | 51.0 | 53.4 | 10 | 8 | 7 |
| 3 | 47.6 | 51.1 | 48.1 | 6 | 6 | 7 |
| 4 | 53.1 | 49.0 | 49.5 | 7 | 6 | 7 |
| 5 | 48.1 | 51.0 | 55.5 | 7 | 11 | 8 |
| 6 | 52.5 | 49.0 | 52.3 | 9 | 9 | 8 |
| | 306.1 | 302 | 309.3 | 49 | 47 | 44 |
| | 51 | 50.3 | 51.5 | 8.2 | 7.8 | 7.3 |
| | 15,647.7 | 15,206 | 15,981.2 | 415 | 387 | 324 |
| Grade 2 | | | | | | |
| 7 | 56.0 | 44.5 | 51.3 | 9 | 7 | 6 |
| 8 | 45.3 | 51.2 | 51.0 | 4 | 7 | 6 |
| 9 | 53.9 | 44.6 | 43.9 | 7 | 4 | 4 |
| 10 | 51.9 | 50.0 | 47.0 | 7 | 8 | 9 |
| 11 | 51.6 | 46.9 | 47.0 | 8 | 6 | 4 |
| 12 | 44.8 | 50.6 | 47.6 | 6 | 8 | 5 |
| | 303.5 | 287.8 | 287.8 | 41 | 40 | 34 |
| | 50.6 | 48 | 48 | 6.8 | 6.7 | 5.7 |
| | 15,456.5 | 13,850.8 | 13,843.7 | 295 | 278 | 210 |
| Grade 3 | | | | | | |
| 13 | 42.8 | 43.4 | 42.8 | 2 | 5 | 3 |
| 14 | 50.6 | 50.0 | 47.9 | 6 | 6 | 4 |
| 15 | 52.3 | 43.0 | 49.4 | 7 | 7 | 8 |
| 16 | 51.5 | 44.9 | 48.2 | 9 | 4 | 5 |
| 17 | 47.4 | 43.9 | 53.8 | 6 | 1 | 9 |
| 18 | 45.7 | 50.0 | 42.0 | 4 | 8 | -1 |
| | 290.3 | 275.2 | 284.1 | 34 | 31 | 28 |
| | 48.4 | 45.9 | 47.3 | 5.7 | 5.2 | 4.7 |
| | 14,115 | 12,675.8 | 13,548.3 | 222 | 191 | 196 |
| | 899.9 | 865 | 881.2 | 124 | 118 | 106 |
| | 50 | 48.1 | 48.9 | 6.9 | 6.6 | 5.9 |
| | 45,219.2 | 41,732.6 | 43,373.2 | 932 | 856 | 730 |

1/ See page 55 for table explanation.

## Lot No. 17 1/

| | YIELD Day | | | GRADE Day | | |
|---|---|---|---|---|---|---|
| Grade 1 | 1 | 2 | 3 | 1 | 2 | 3 |
| 1 | 50.5 | 50.4 | 48.7 | 9 | 5 | 8 |
| 2 | 49.1 | 51.9 | 48.5 | 7 | 9 | 7 |
| 3 | 48.2 | 50.5 | 49.6 | 6 | 8 | 8 |
| 4 | 52.2 | 48.4 | 51.2 | 8 | 10 | 6 |
| 5 | 48.9 | 46.9 | 55.1 | 5 | 6 | 9 |
| 6 | 50.0 | 49.1 | 48.0 | 9 | 8 | 8 |
| | 298.9 | 297.2 | 301.1 | 44 | 46 | 46 |
| | 49.8 | 49.5 | 50.2 | 7.3 | 7.7 | 7.7 |
| | 14,900.4 | 14,737 | 15,145.6 | 336 | 370 | 358 |
| Grade 2 | | | | | | |
| 7 | 52.8 | 50.4 | 49.5 | 7 | 8 | 8 |
| 8 | 53.8 | 49.5 | 52.6 | 9 | 7 | 9 |
| 9 | 49.5 | 45.4 | 52.7 | 8 | 7 | 11 |
| 10 | 51.0 | 51.1 | 55.0 | 5 | 6 | 10 |
| 11 | 53.4 | 48.4 | 52.3 | 6 | 8 | 9 |
| 12 | 50.5 | 48.4 | 50.0 | 6 | 7 | 8 |
| | 311 | 293.2 | 312.1 | 41 | 43 | 55 |
| | 51.8 | 48.9 | 52.0 | 6.8 | 7.2 | 9.2 |
| | 16,135.4 | 14,347.9 | 16,254.6 | 291 | 311 | 511 |
| Grade 3 | | | | | | |
| 13 | 52.1 | 52.3 | 48.7 | 6 | 8 | 7 |
| 14 | 48.9 | 48.7 | 48.9 | 7 | 6 | 8 |
| 15 | 51.1 | 51.4 | 50.8 | 8 | 8 | 7 |
| 16 | 51.0 | 50.5 | 54.8 | 7 | 8 | 9 |
| 17 | 48.8 | 50.0 | 48.6 | 5 | 6 | 7 |
| 18 | 51.8 | 50.9 | 47.9 | 9 | 7 | 8 |
| | 303.7 | 303.8 | 299.7 | 42 | 43 | 46 |
| | 50.6 | 50.6 | 49.9 | 7 | 7.2 | 7.7 |
| | 15,382.5 | 15,390 | 15,003 | 304 | 313 | 356 |
| | 913.6 | 894.2 | 912.9 | 127 | 132 | 147 |
| | 50.7 | 49.9 | 50.7 | 7.0 | 7.4 | 8.2 |
| | 46,418.3 | 44,474.9 | 46,403.2 | 931 | 994 | 1,225 |

1/ See page 55 for table explanation.

ITEM 3.

Total Lamb Data

## Total Lamb Data

| | YIELD | | | GRADE | | |
|---|---|---|---|---|---|---|
| | 1. | 2. | 3. | 1. | 2. | 3. |
| **ALL NO. 1. GRADES** | | | | | | |
| $\Sigma X$ | 5,266.6 | 5,268.0 | 5,217.4 | 824 | 807 | 772 |
| $\bar{X}$ | 51.6 | 51.6 | 51.2 | 8.1 | 7.9 | 7.6 |
| $\Sigma X^2$ | 272,940.6 | 273,538.8 | 268,455.4 | 6, 848 | 6,575 | 6,128 |
| **ALL NO. 2. GRADES** | | | | | | |
| $\Sigma X$ | 5,162.6 | 5,122.0 | 5,187.0 | 730 | 690 | 696 |
| $\bar{X}$ | 50.6 | 50.2 | 50.9 | 7.2 | 6.8 | 6.8 |
| $\Sigma X^2$ | 262,327.4 | 258,681.4 | 265,418.1 | 5,442 | 4,760 | 5,053 |
| **ALL NO. 3. GRADES** | | | | | | |
| $\Sigma X$ | 5,140.7 | 5,123.4 | 5,018.2 | 661 | 624 | 611 |
| $\bar{X}$ | 50.4 | 50.2 | 49.2 | 6.5 | 6.1 | 6.0 |
| $\Sigma X^2$ | 260,429.6 | 261,272.9 | 246,149.2 | 4,516 | 4,150 | 4,039 |
| **ALL LOTS COMBINED** | | | | | | |
| $\Sigma X$ | 15,569.9 | 15,513.4 | 15,422.6 | 2,215 | 2,121 | 2,079 |
| $\bar{X}$ | 50.9 | 50.7 | 50.4 | 7.2 | 6.9 | 6.8 |
| $\Sigma X^2$ | 795,697.6 | 793,493.1 | 780,022.7 | 16,806 | 15,485 | 15,225 |

## Total Lamb Data By Groupings

| | | | | | | |
|---|---|---|---|---|---|---|
| **WESTERN LAMBS** | | | | | | |
| $\Sigma X$ | 6,444.1 | 6,521.4 | 6,519.0 | 940 | 889 | 886 |
| $\bar{X}$ | 51.1 | 51.8 | 51.7 | 7.5 | 7.1 | 7.03 |
| $\Sigma X^2$ | 330,899.1 | 342,253.7 | 336,692.1 | 7,280 | 6,637 | 6,610 |
| 7 lots 1,2,3,4,5,6,7 | | | | | | |
| **NATIVE LAMBS** | | | | | | |
| $\Sigma X$ | 7,310.6 | 7,188.2 | 7,126.3 | 1,018 | 971 | 939 |
| $\bar{X}$ | 50.8 | 49.9 | 49.5 | 7.1 | 6.7 | 6.5 |
| $\Sigma X^2$ | 373,062.1 | 360,354.9 | 354,827.9 | 7,625 | 7,041 | 6,729 |
| 8 lots 9,11,12,13,14,15, 16,17 | | | | | | |
| **FED LAMBS** | | | | | | |
| $\Sigma X$ | 1,815.2 | 1,806.6 | 1,777.4 | 257 | 251 | 254 |
| $\bar{X}$ | 50.4 | 50.2 | 49.4 | 7.1 | 7.0 | 7.1 |
| $\Sigma X^2$ | 91,736.2 | 90,884.5 | 88,500.7 | 1,901 | 1,807 | 1,886 |
| 2 lots 8, 10 | | | | | | |

# APPENDIX D

## ANALYSIS OF VARIANCE DATA

## Analysis of Variance Results

### Yield

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| Lot No. 1 | Western Lambs | | | |
| TOTAL | 52 | 426.6 | | |
| DAYS | 2 | .4 | .2 | - |
| GRADE | 2 | 4.5 | 2.3 | - |
| DAYS X GRADE | 4 | 29.6 | 7.4 | - |
| ERROR | 44 | 392.1 | 8.91 | |
| Lot No. 2 | Western Lambs | | | |
| TOTAL | 53 | 1/ | | |
| DAYS | 2 | - | 1/ | - |
| GRADE | 2 | 36.8 | 18.3 | - |
| DAYS X GRADE | 4 | 5.51 | 1.4 | - |
| ERROR | 45 | 262.70 | 5.8 | |
| Lot No. 3 | Western Lambs | | | |
| TOTAL | 53 | 386 | | |
| DAYS | 2 | 86.1 | 43.05 | 2/ |
| GRADE | 2 | 13.3 | 6.65 | - |
| DAYS X GRADE | 4 | 46.6 | 11.6 | - |
| ERROR | 45 | 240.00 | 5.33 | |

1/ Less than one.
2/ Highly significant.

## Analysis of Variance Results

### Yield

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| Lot No. 4 | Western Lambs | | | |
| TOTAL | 53 | 1,204.7 | | |
| DAYS | 2 | 212.7 | 106.4 | 2/ |
| GRADE | 2 | 109.8 | 54.9 | - |
| DAYS X GRADE | 4 | 40.9 | 10.2 | - |
| ERROR | 45 | 841.3 | 18.9 | |
| Lot No. 5 | Western Lambs | | | |
| TOTAL | 53 | 437.6 | | |
| DAYS | 2 | 112.3 | 56.2 | 2/ |
| GRADE | 2 | 17.6 | 8.8 | - |
| DAYS X GRADE | 4 | 137.0 | 34.3 | 2/ |
| ERROR | 45 | 170.7 | 3.79 | |
| Lot No. 6 | Western Lambs | | | |
| TOTAL | 53 | 316.1 | | |
| DAYS | 2 | 15.4 | 7.7 | - |
| GRADE | 2 | 10.6 | 5.3 | - |
| DAYS X GRADE | 4 | 22.7 | 5.7 | - |
| ERROR | 45 | 267.4 | 5.5 | |

2/ Highly significant.

## Analysis of Variance Results

### Yield

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| Lot No. 7 | Western Lambs | | | |
| TOTAL | 52 | 201.7 | | |
| DAYS | 2 | 2.1 | 1.1 | - |
| GRADE | 2 | 16.2 | 8.1 | - |
| GRADE X DAYS | 4 | 5.8 | 1.5 | - |
| ERROR | 44 | 177.6 | 4.0 | |
| Lot No. 8 | Fed Lambs | | | |
| TOTAL | 53 | 316.7 | | |
| DAYS | 2 | 3.5 | 1.8 | - |
| GRADE | 2 | 2.5 | 1.3 | - |
| GRADE X DAYS | 4 | 20.6 | 5.2 | - |
| ERROR | 45 | 290.1 | 6.4 | |
| Lot No. 9 | Native Lambs | | | |
| TOTAL | 53 | 1,385.6 | | |
| DAYS | 2 | 7.5 | 3.8 | - |
| GRADE | 2 | 87.3 | 43.7 | - |
| GRADE X DAYS | 4 | 171.0 | 42.8 | - |
| ERROR | 45 | 1,119.8 | 24.9 | |

## Analysis of Variance Results

### Yield

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| **Lot No. 10** | **Fed Lambs** | | | |
| TOTAL | 53 | 769.4 | | |
| DAYS | 2 | 33.1 | 16.5 | - |
| GRADE | 2 | 1.7 | 0.9 | - |
| DAYS X GRADE | 4 | 111.7 | 27.9 | - |
| ERROR | 45 | 622.9 | 13.8 | |
| **Lot No. 11** | **Native Lambs** | | | |
| TOTAL | 53 | 622.9 | | |
| DAYS | 2 | 76.3 | 38.2 | 3/ |
| GRADE | 2 | 92.5 | 46.3 | 3/ |
| DAYS X GRADE | 4 | 18.1 | 4.5 | - |
| ERROR | 45 | 436.0 | 9.7 | |
| **Lot No. 12** | **Native Lambs** | | | |
| TOTAL | 53 | 1,173.7 | | |
| DAYS | 2 | 28.5 | 14.3 | - |
| GRADE | 2 | 178.2 | 89.6 | 3/ |
| DAYS X GRADE | 4 | 89.0 | 22.3 | - |
| ERROR | 45 | 878.0 | 19.5 | |

3/ Significant at the 5% level.

## Analysis of Variance Results

### Yield

| | DF | SS | MS | Significance |
|---|---|---|---|---|
| Lot No. 13 | Native Lambs | | | |
| TOTAL | 53 | 244.8 | | |
| DAYS | 2 | 1.9 | 0.95 | - |
| GRADE | 2 | 13.8 | 6.9 | - |
| DAYS X GRADE | 4 | 14.4 | 3.6 | - |
| ERROR | 45 | 214.7 | 4.8 | |
| Lot No. 14 | Native Lambs | | | |
| TOTAL | 53 | 591.9 | | |
| DAYS | 2 | 42.8 | 21.4 | - |
| GRADE | 2 | 70.2 | 35.1 | 3/ |
| DAYS X GRADE | 4 | 11.8 | 2.9 | - |
| ERROR | 45 | 467.1 | 10.4 | |
| Lot No. 15 | Native Lambs | | | |
| TOTAL | 53 | 321.2 | | |
| DAYS | 2 | 22.9 | 11.5 | - |
| GRADE | 2 | 28.5 | 14.3 | - |
| DAYS X GRADE | 4 | 22.7 | 5.6 | - |
| ERROR | 45 | 247.1 | 5.5 | |

3/ Significant at the 5% level.

## Analysis of Variance Results

### Yield

| | DF | SS | MS | Significance |
|---|---|---|---|---|
| Lot No. 16 | Native Lambs | | | |
| TOTAL | 53 | 661.2 | | |
| DAYS | 2 | 33.9 | 16.9 | - |
| GRADE | 2 | 128.4 | 64.2 | 2/ |
| DAYS X GRADE | 4 | 17.2 | 4.3 | - |
| ERROR | 45 | 481.7 | 10.7 | |
| Lot No. 17 | Native Lambs | | | |
| TOTAL | 53 | 218.5 | | |
| DAYS | 2 | 13.5 | 6.8 | - |
| GRADE | 2 | 10.8 | 5.4 | - |
| DAYS X GRADE | 4 | 16.5 | 4.1 | - |
| ERROR | 45 | 177.7 | 3.9 | |

2/ Highly significant.

## Analysis of Variance Results

### Grade

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| **Lot No. 1** | **Western Lambs** | | | |
| TOTAL | 53 | 181 | | |
| DAYS | 2 | 9 | 4.5 | - |
| GRADE | 2 | 11 | 5.5 | - |
| DAYS X GRADE | 4 | 14 | 3.5 | - |
| ERROR | 45 | 147 | 3.3 | |
| | **Western Lambs** | | | |
| **Lot No. 2** | | | | |
| TOTAL | 53 | 137 | | |
| DAYS | 2 | 1 | .5 | - |
| GRADE | 2 | 30 | 15.0 | 1/ |
| DAYS X GRADE | 4 | 8 | 2.0 | - |
| ERROR | 45 | 98 | 2.2 | |
| | **Western Lambs** | | | |
| **Lot No. 3** | | | | |
| TOTAL | 53 | 155 | | |
| DAYS | 2 | 9 | 4.5 | - |
| GRADE | 2 | 33 | 16.5 | 1/ |
| DAYS X GRADE | 4 | 11 | 2.8 | - |
| ERROR | 45 | 102 | 2.3 | |

1/ Significant at the 1% level.

## Analysis of Variance Results

### Grade

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| **Lot No. 4** | **Western Lambs** | | | |
| TOTAL | 3 | 237 | | |
| DAYS | 2 | 6 | 3.0 | - |
| GRADE | 2 | 86 | 43.0 | 1/ |
| DAYS X GRADE | 4 | 8 | 2.0 | - |
| ERROR | 45 | 137 | 3.0 | |
| **Lot No. 5** | **Western Lambs** | | | |
| TOTAL | 53 | 108 | | |
| DAYS | 2 | 9 | 4.5 | - |
| GRADE | 2 | 18 | 9.0 | 1/ |
| DAYS X GRADE | 4 | 8 | 2.0 | - |
| ERROR | 45 | 73 | 1.6 | |
| **Lot No. 6** | **Western Lambs** | | | |
| TOTAL | 53 | 109 | | |
| DAYS | 2 | 1 | .5 | - |
| GRADE | 2 | 24 | 12.0 | 1/ |
| DAYS X GRADE | 4 | 2 | .5 | - |
| ERROR | 45 | 82 | 1.8 | |

1/ Significant at the 1% level.

## Analysis of Variance Results

### Grade

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| Lot No. 7 | Western Lambs | | | |
| TOTAL | 53 | 89 | | |
| DAYS | 2 | 2 | 1.0 | - |
| GRADE | 2 | 3 | 1.5 | - |
| DAYS X GRADE | 4 | 4 | 1.0 | - |
| ERROR | 45 | 80 | 1.8 | |
| Lot No. 8 | Fed Lambs | | | |
| TOTAL | 53 | 109 | | |
| DAYS | 2 | 3 | 1.5 | - |
| GRADE | 2 | 14 | 7.0 | 2/ |
| DAYS X GRADE | 4 | 9 | 2.3 | - |
| ERROR | 45 | 83 | 1.8 | |
| Lot No. 9 | Native Lambs | | | |
| TOTAL | 53 | .2 | | |
| DAYS | 2 | .26 | .13 | - |
| GRADE | 2 | .4 | 58.5 | 1/ |
| DAYS X GRADE | 4 | 39.5 | 9.8 | 2/ |
| ERROR | 45 | 117 | 2.6 | |

1/ Significant at the 1% level.
2/ Significant at the 5% level.

## Analysis of Variance Results

### Grade

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| **Lot No. 10** | **Fed Lambs** | | | |
| TOTAL | 53 | 79 | | |
| DAYS | 2 | 5 | 2.5 | - |
| GRADE | 2 | 6 | 3.0 | - |
| DAYS X GRADE | 4 | 3 | .8 | - |
| ERROR | 45 | 65 | 1.4 | |
| **Lot No. 11** | **Native Lambs** | | | |
| TOTAL | 53 | 202 | | |
| DAYS | 2 | 23 | 11.5 | 2/ |
| GRADE | 2 | 20 | 10.0 | 2/ |
| DAYS X GRADE | 4 | 7 | 1.8 | - |
| ERROR | 45 | 152 | 3.4 | |
| **Lot No. 12** | **Native Lambs** | | | |
| TOTAL | 53 | 225 | | |
| DAYS | 2 | 18 | 9.0 | - |
| GRADE | 2 | 60 | 30.0 | 1/ |
| DAYS X GRADE | 4 | 5 | 1.3 | - |
| ERROR | 45 | 142 | 3.2 | |

1/ Significant at the 1% level.
2/ Significant at the 5% level.

## Analysis of Variance Results

### Grade

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| **Lot No. 13** | **Native Lambs** | | | |
| TOTAL | 53 | 92 | | |
| DAYS | 2 | 2 | 1 | - |
| GRADE | 2 | 13 | 6.5 | 1/ |
| DAYS X GRADE | 4 | 24 | 6.0 | 2/ |
| ERROR | 45 | 53 | 1.2 | |
| **Lot No. 14** | **Native Lambs** | | | |
| TOTAL | 53 | 170 | | |
| DAYS | 2 | 2 | 1.0 | - |
| GRADE | 2 | 45 | 22.5 | 1/ |
| DAYS X GRADE | 4 | 6 | 1.5 | - |
| ERROR | 45 | 117 | 2.6 | |
| **Lot No. 15** | **Native Lambs** | | | |
| TOTAL | 53 | 133 | | |
| DAYS | 2 | 19 | 9.5 | 2/ |
| GRADE | 2 | 28 | 14.0 | 1/ |
| DAYS X GRADE | 4 | 1 | .25 | - |
| ERROR | 45 | 85 | 1.9 | |

1/ Significant at the 1% level.
2/ Significant at the 5% level.

## Analysis of Variance Results

### Grade

| | Df | SS | MS | Significance |
|---|---|---|---|---|
| Lot No. 16 | Native Lambs | | | |
| TOTAL | 53 | 275 | | |
| DAYS | 2 | 9 | 4.5 | - |
| GRADE | 2 | 61 | 30.5 | 1/ |
| DAYS X GRADE | 4 | 1 | .3 | - |
| ERROR | 45 | 204 | 4.5 | |
| Lot No. 17 | Native Lambs | | | |
| TOTAL | 53 | 97 | | |
| DAYS | 2 | 12 | 6 | 2/ |
| GRADE | 2 | 1 | .5 | - |
| DAYS X GRADE | 4 | 9 | 2.3 | - |
| ERROR | 45 | 75 | 1.7 | |

1/ Significant at the 1% level.
2/ Significant at the 5% level.