

Using ultrasound scanning and performance testing technology to increase loin-eye area in lamb

Final Report for FNE05-546

Project Type: Farmer

Funds awarded in 2005: \$5,785.00

Projected End Date: 12/31/2007

Region: Northeast

State: Maryland

Project Leader:

[John Hall](#)

Hall Suffolks

Project Information

Summary:

Note to reader, attached is the complete final report for FNE05-546

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Summary

This project was designed to show shepherds the value of using ultra sound in scanning loin-eye when selecting replacement rams. Lambs were ultra-sounded to measure loin-eye area (LEA) at three different weights during their growth. LEA was adjusted to a standard weight each time. The original thought was that these three weights would add additional data points to the study. The research pointed out that the scanning and weight adjustment has to be done very close to the final weight to represent the correct LEA. Thus, we were not able to significantly prove the hypothesis; however, we were able to complete a significant step toward proving it. Although I did not reach the initial conclusion, this grant allowed me to determine that ultra sound measurements must be completed at a weight very close to the target weight in order to be useful.

Goals

Increasing rib eye area in sheep has been a challenge for me that I have not been able to master. I have measured and recorded loin-eye area (LEA) in my flock since 1999. I have communicated with breeders across the nation, about using ultra sound technology to increase loin-eye measurement in my flock. I have used a regression equation developed at Iowa State to adjust the LEA's to a standard weight. It was my assumption over the years that this equation would allow me to

use ultra sound at various weights. I adjust to a standard weight and select breeding stock from the top.

I have consigned rams to the Penn State Ram Test for the past several years and have had discussions with sheep specialists there about the regression equations they use to compute an LEA index in sale animals. I should note that Penn State uses a different equation than the one I use. The Penn State Equation adjusts the rams to the average weight of the pen, instead of to an average weight of 125 to 135 pounds.

The heritability of loin-eye area is nearly 50%. With heritability this high, I questioned why it was so difficult to improve my flock. Part of the data listed in the appendix will show my flock's LEA's. At first glance, the data appears to indicate that I was going backward. That is what challenged me to complete this research in using ultra sound to increase loin-eye area in sheep.

Farm Profile

I have a small flock of 20-25 females. Due to current land prices and availability, I do not see an opportunity to increase numbers. I do see an opportunity to increase quality. I also see an opportunity to offer fellow-breeders information that can impact the carcass characteristic in their flock. Ultimately, we need to create an awareness and understanding for this technology that will allow the lamb industry to move forward and develop a product that is equal, and hopefully superior to foreign imports. My small flock size and willingness to collect data will hopefully allow me to offer the sheep industry some useful research that will move the industry forward and enabling it to compete with foreign imports. I hope it will also encourage breeders to select rams that have scanned LEA data available.

I am a County Extension Educator with extensive experience in the animal industry. I worked with the National Holstein Association out of college and have always been intrigued with animal breeding. I raised sheep as one of my projects back in my 4-H days. I chose sheep as an enterprise for my kids when they then joined 4-H so this allowed me to get back in sheep business. With my animal background, and a challenge to improve, I have always wanted to increase certain traits in the animals I have worked with. As a result, I have enrolled my flock in nearly all the breed improvement programs available. The flock is enrolled in the National Sheep Improvement Program, NSIP, which measures performance. I was the third flock enrolled in the Scrapie program in Maryland. I have also tried to tinker with the structural characteristics of length of body, length of loin, and stature by using various types of sheep. As I have matured, I have come to realize that the one constant trait that sheep breeders in America need to join forces on is carcass traits.

Participants

Fellow Extension Educators at Maryland have been very helpful. Willard Lemaster, 4-H specialist, was instrumental in the ultra sound measurement. Dr. Nicki Whitely, University of Maryland, Eastern Shore allowed research equipment to be available as well as bringing graduate students to help. Susan Schoenian, Regional Sheep specialist was also instrumental. Susan challenged me several years ago and told me that I could never breed a healthy, productive, meaty, black-face sheep. In addition to this challenge, Susan was also helpful in developing the web page.

A special thanks goes to Dahlia J. Jackson, Ph.D., Acting Director, Assateague Coastal Ecology Teaching and Research Center, University of Maryland Eastern Shore. Dr. Jackson was essential in making some sense from the data by sorting it statistically.

Project Activities

Sire Search and Selection:

The project began by doing a worldwide sire search. In the U.S., packers look for lambs that finish at 120 - 140 pounds. As a result, this was the market that I chose to define as ideal. I was fortunate to speak with a group of shepherds from Australia and New Zealand at Congressman Wayne Gilchrest's office. This contact allowed me to consult with the New Zealand national lamb data base. I found that New Zealand lambs are marketed at a lighter weight than the US lambs. I was not able to find sires that approached a 4 square inch loin and finish at 120 - 140 pounds. I was also discouraged by the lack of available semen and the import restrictions that exist; therefore, I turned my focus back to the U.S.

Fortunately, I found Bob Kimm, from Dysart, Iowa, a very notable Suffolk breeder. I knew Bob and had used his genetics artificially in the past. Bob is a leader in the industry. He has an annual production sale and sells breeding stock that have been measured for LEA. I have discussed sheep breeding to increase LEA's with Bob on several occasions over the years.

I selected 2 rams from Bob's sale to focus on for this project - 5006 and 5075. They were maternal brothers out of Bob's lead sire Me 38. They were also a maternal brother to the sire I had purchased the previous year. I knew from genetics classes that I must sample sires from a known genetic pool in order to ensure I would find a sire that would and could increase loin-eye as the research data indicates. I offer a side note on genetic selection here. A population will follow a bell shaped curve. There will be equal numbers above the median as there are below the median. In other words, half the population will increase/improve, a given trait and half the population will decrease/reduce, the given trait. By selecting sample sires with above average traits, I knew that I should increase my odds for increasing loin-eye in sheep.

The rams I selected were in the top 20% of loins in Bob's flock. The rams are as follows:

Kimm 4015: Born 12/31/03. Measured 3.35 square inches LEA and 0.29 inches back fat adjusted to 135 pounds.

Kimm 5006: Born 12/22/04. Measured 3.58 square inches LEA and 22 inches back fat adjusted to 135 pounds.

Kimm 5075: Born 1/3/04. Measured 3.61 square inches LEA and 29 inches of back fat adjusted to 135 pounds.

I went back to Bob in 2006 and purchased Kimm 6021.

Kimm 6021: Born 12/19/05. Measured 3.54 square inches LEA and 21 in back fat adjusted to 135 pounds. 6021 is out of a well proven son of Me 38.

Breeding:

I have selected for loin-eye area in my flock over the past few years. At least I thought I was. Mating was not done randomly. I bred the ewes to improve their type. 5075 was a wider thicker appearing ram than was 5006. 5006 had more stretch and length even though their loin scan was very similar. 4015 was used on ewes that were more moderate.

Records:

At lambing, lambs were identified, weighed, and tagged. Lambs were weighed at several intervals thorough out their growing season. Weaning weights were taken

and submitted to NSIP, National Sheep Improvement Program, for evaluation. I weighed monthly beyond weaning to collect growth data for NSIP evaluation.

Using Ultra Sound:

At the beginning of the project, I assumed that I could use the loin-eye adjustment calculation developed at Iowa State to adjust all lambs to a given weight of 125 to 135 pounds. I did not question this adjustment; however, since I had a small flock I chose to take ultra sound measurements at three different weights to increase data points. You will see that we weighed and scanned in May, June and September. Please understand that it would very beneficial if we could scan lambs at lighter weights. This would allow a flock like mine to scan early, identify the larger loins, and sell lambs not kept for breeding to the 4-H markets.

Results

A. The Iowa State Adjustment Equation that I have used over the years is:
Adjusted Loin-eye Area (125 pounds) = Loin-eye Area (LEA) + ((125 - (Weight at scanning) *0.013)

B. Correct Weight to Scan

I scanned the lambs three times. Once on May 9 when they weighed an average 65.4 pounds, again on June 20 when then weighed an average 94.9 pounds, and the final time on September 12 when they weighed an average 129.7 pounds. The summary of these results is shown in Table 1. The complete individual data is shown in the Appendix as Table 1A.

Conclusion: The adjusted loin-eye areas were not correlated and useful at lighter weights.

It was not until we applied statistics that I realized the weight the lambs were scanned at was a significant factor when using the adjustment equation from Iowa State. To verify that we need to ultra sound/scan at heavier weights/or ultrasound closer to the adjusted LEA weight of 125 lbs., we did a correlation on the September (average weight - 129 lb.) actual LEA to the three adjusted LEA's measured in May (average wt. - 65.1 lbs.), June (average wt. - 95 lbs., and September (average wt. - 129 lbs.) to see how correlated they were. The results indicated that only the September adjusted LEA's were significantly correlated to the actual LEA in September. This indicates that the adjusted 125 lb. LEA estimated at lighter weights were not useful estimates of what the actual LEA would be at 125 lbs. Since the correlations between the actual September LEA and the 2 light weights' adjusted LEA's were so low one could not assume that lambs would keep the same order if scanned earlier. Only 12 lambs were weighed and scanned at all three times so, in order to make specific conclusions from this data, you would need more data points than that.

C. History of Weight at Scanning

Determining the appropriate weight to scan was a significant factor that we did not foresee when the project began. As a result, we went back and looked at the weights the flock had been scanned at in previous years.

The letters in the table indicate which years were similar and which were significantly different ($P < 0.05$). For instance, the average mean weight in 2001 (154.136) was different from all the other years. The letters indicate years that were similar. In 2005, I thought that I could scan at a lighter weight and use a regression equation to determine which lambs should be kept for breeding stock. As I review the data shown in Table 2, I now see why it is difficult to compare 2003, 2004, 2005 with 2006. Note that I had thought the Iowa State Equation could adjust appropriately at these lighter weights.

This intermediate result was very significant for me. I did not realize how critical weight would be in doing this study. I had assumed that the adjustment factor could handle a much broader weight range.

We also went back and analyzed the year and the sire of the lambs for that given year. This data is presented in the Appendix as Table 2A and 3A. Although this statistical data is more than most people want, it does provide some insight for this project.

Table 4A presents the list of sires and offspring used in the flock for the past 10 years. I have also grouped the sires by type. In the Suffolk breed, there exists a wide range of body types. In fact, some may argue that these types almost represent different breeds. I do not wish to discuss this further in this paper other than making my definition of these body types:

- a) Frame: The taller larger framed sheep are those that one generally sees in the breeding classes at breed shows at the fairs.
- b) Commercial: Sheep that are somewhere between frame and whether type.
- c) Whether : Sheep that have been selected for market classes at fairs and shows.

Please note that this data has limited usefulness since the sample size was so small. As I mentioned, I have used many types of sheep to try and change the body conformation.

Conditions

I wish I could have had data from 100 lambs because, in a genetics population study such as this, additional numbers are always beneficial. My next grant of this type will try to capture information from other breeders across America to develop a data set that will ensure more significant results.

I also encountered some back luck. I believe I produced a superior ram lamb that could have been a very useful piece for the this breeding study. Hall 6332 was born 4/18/06. This ram lamb scanned 4.21 share inches LEA actual at 127 pounds. This proved to be the highest scanning lamb in the 2006 lamb crop. 6332 was a 5075 son out of a 4015 daughter. Unfortunately, 6332 received a neck injury the evening that I sheared him and the day before we scanned. The injury was a permanent injury that required me to butcher him. I did save 6230 and sampled him. 6230 scanned 3.51 square inches at 143 pounds.

Economic

It is too early to predict the economic benefit of this research. I believe that we must educate the public, the shepherds, that will be purchasing replacement rams, about the value of using ultra sound to select for Loin-eye area when selecting replacement rams.

Assessment

This grant started out as a project to show the value of using ultra sound in selecting rams to increase LEA in lamb. I thought that I could use the formula developed by Iowa State to adjust all the lambs to a weight of 125 pounds. I knew that I had to sample young sires from a selected data base. What I did not know is that the lambs would need to be scanned near the target weight for the adjustment equation to be useful.

Adoption

I will continue to work on developing this trait. I have submitted another grant application to try and expand this data base and include other breeders from across the country in hopes that we can get some useful data to put into a publication that will engage breeders into adapting this technology. I believe that the use of Ultra

Sound to measure and assure adequate muscle thickness is a proven way to increase carcass traits and increase the acceptance of our American lamb.

Outreach

- a. I gave presentations at the Pennsylvania Ram Test Sale and Conference in 2005 and 2006. I have attached the 2006 power point presentation.
- b. I developed a website, Hallsuffolks.com, and included the Loin-eye information
- c. I will be submitting an article to various breed publications (included herewith)
- d. I did not do an educational brochure since I did not develop sufficient data. Now that I know I must ultra sound at a given weight, I will resume the research and hopefully attain sufficient data to make a significant conclusion.
- e. I am also currently working with Dr. David Notter, VPI, and his graduate student, Joe Emenheiser. Joe is doing a Masters thesis on this work. Dr Notter plans to incorporate this data into the NSIP calculations that Dr. Notter does at the national level.

- [FNE05-546 Final Report](#)
- [Powerpoint](#)

Cooperators

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Research

Participation Summary

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture or SARE.



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