

## Let's Grow Program Round 3 – Funded Projects, 2016

### **Determining Anthelmintic Resistance in the Southeast U.S**

**AWARDED TO:**

Western Maryland Commercial Sheep Producer Group via University of Maryland (Extension)

**SCOPE:**

Maryland, Virginia, Georgia

**SUMMARY:**

The purpose of this project is to determine the level of anthelmintic resistance on thirty commercial sheep farms in Maryland, Virginia, and Georgia by cost-sharing (50% @ \$225) the DrenchRite® test (\$450) and conducting a follow-up visit with each farm to discuss the results of the test and strategies for dealing with anthelmintic resistance. Large (100+ ewes) commercial farms that graze their lambs will be favored for cost-sharing. Farmer participants will be drawn from the membership of the newly forming Western Maryland Commercial Sheep Group, New River Valley Sheep & Goat Club (in Virginia), and Georgia Sheep and Wool Growers Association. The results of the tests will be shared collectively with the industry to provide an updated overview of anthelmintic resistance in the Southeast.

**STATUS:**

Complete.

**FINAL REPORT:** [Click Here](#)

## **Producer Group Implementation of the 150% Challenge**

### **AWARDED TO:**

Producers Marketing Cooperative Incorporated

### **SCOPE:**

Texas

### **SUMMARY:**

This project will work with 6 ranchers to implement 2 or more components of the “12 Lamb Crop Best Practices” factsheet. They will serve as case studies to demonstrate applicable techniques to increase lamb crop on Texas range sheep operations. These case studies will be used by PMCI and Texas A&M AgriLife Extension to demonstrate how to increase lamb crop in Texas range sheep operations.

### **STATUS:**

Complete.

### **PROGRESS REPORT:**

#### **150% Lamb Crop Challenge - Case Studies**

This report highlights 3 ranchers that implemented multiple components from the "12 Lamb Crop Best Practices" factsheet to work towards a 150% lamb crop. They serve as case studies to demonstrate how applicable techniques can be used to increase lamb crops on Texas range sheep operations. This project was partially funded by the American Sheep Industry Association's "Lets Grow" program. These factsheets can be found at <https://www.lambresourcecenter.com/productivity-resources>

All three cooperating ranches manage range lambing commercial finewool ewes. In each case, the operators decided that their first best management practice to implement was to "Test for Pregnancy Status." This allowed them to "Cull Underperforming Ewes," provide "Optimal Nutrition," and "Select for Prolific Genetics." For the 2017 and 2018 lambing season, ewes were pregnancy tested via ultrasound and sorted into different pastures based on pregnancy status, i.e., single, twin, or open.

#### **HF4 Ranch - Managed by the Fisher Family**

The ewes were scanned in September for a November/December lambing. The mature ewes scanned as 26% twins, 63% singles, and 11% open. The ewe lambs scanned as 6% twins, 16% singles, and 78% open. This highlighted the fact that ewe lambs need to be better fed and/or delayed in breeding to get a better breed up rate and shorten the lambing window. A follow-up pregnancy test confirmed that 50% of mature ewes and ewe lambs that were scanned open at the first scan were going to be late lambing.

At marking, the twin baring ewes reared a 135% lamb crop and the single baring ewes reared a 96% lamb crop. This represents a nearly 40% increase in potential lamb crop by selecting for more prolific sheep; however, this also shows that sheep that have not been selected for multiple births have a high rate of lamb loss. Even so, only ewe lambs from the twin baring ewes were kept as replacements.

A similar protocol was implemented the following year. The mature ewes scanned as 32% twins, 63% singles, and 4% open. The ewe lambs scanned as 39% bred and 61% open, which is an improvement compared to the prior year. At marking, the twin baring ewes reared a 110% lamb crop and the single baring ewes reared an 88% lamb crop. Harsh weather during lambing, dry conditions, and predation results in an overall lower lamb crop. Even so, the twin pasture reared a 22% higher lamb crop. Again, ewe lambs from the twin baring ewes were kept as replacements.

Forty eight percent of ewes that were scanned as twin-baring in year 1 were scanned as twin baring in year 2. As would be expected, not all ewes are going to have twins every year, but the twinning rate was roughly double for ewes that were scanned to have twins vs. a singleton the previous year.

In addition to selection of replacement within their own operation, the HF4 ranch also purchased 3 outside rams from NSIP breeders that have strategically selected for improved lamb crop. They have also purchased a seedstock flock and implementing a confinement lambing system to match ewe to lamb post lambing.

In summary, moving to a 150% lamb crop is a daunting challenge for commercial range producers that have limited data on their animals. However, the preliminary data from this case study indicates this operation's genetic base and management system are moving towards an improved lamb crop.

### **Hillingdon Ranch - Managed by the Giles Family**

The ewes were scanned in December for a March/April lambing. The mature ewes scanned as 42% twins, 52% singles, and 6% open. This is a much higher twinning rate than all other case study participants. The Giles family attributes this to selection of small to medium sized ewes lambs. Twin-baring ewe were sorted off into a separate pasture, which was anticipated to have lower predator issues.

In 2017, whole flock weaning rate was 125%, which represents only an 8% lamb death loss from potential lamb crop at scanning. Twin vs single pastures weaning rates were not collected in 2017. However, at marking, the twin pasture has roughly 1.75 lambs per ewe.

In 2018, a similar protocol was implemented the following year. The mature ewes scanned as 50% twins, 47% singles, and 4% open. The twin baring ewes reared a 175% lamb crop and the single baring ewes reared an 89% lamb crop. The twin pasture reared a 96% higher lamb crop than single pasture. Replacement ewes and rams were kept from the twin baring ewes.

Sixty percent of ewes that were scanned with twins in 2017 were scanned with twins in 2018. As would be expected, not all ewes are going to have twins every year, but the twinning rate was 10% higher for ewes that were scanned to have twins vs. a singleton the previous year. Plus, there was a 0% open rate in 2018 from ewes that scanned with twins in 2017.

In summary, the Hillingdon ranch consistently weaned a 125% lamb crop prior to this case study, which is well above average for range lambing in Texas. Even so, were able to increase their lamb crop by 10% after 1 year of selecting for twin baring ewes. We are confident that within 1 sheep generation (5 to 7 years) this ranch will be at or above the 150% lamb crop.

### **Lonewolf Ranch - Managed by the Demere Family**

The ewes were scanned in November for a January/February lambing. The mature ewes scanned as 30% twins, 63% singles, and 7% open. At marking, the twin

baring ewes reared a 113% lamb crop and the single baring ewes reared an 81% lamb crop. This represents a 32% increase in potential lamb crop by selecting for more prolific sheep; however, this also shows that sheep that have not been selected for multiple births have a high rate of lamb loss. Even so, only ewe lambs from the twin baring ewes were kept as replacements.

In 2017/2018, this operation made some substantial changes in management to attain a higher lamb crop and better select for prolific genetics. First of all, outside rams were purchased from a long-time NSIP breeder that puts strong emphasis on reproductive rate. Secondly, ewe lambs were fed to heavier weights and bred to lamb at 12 vs 24 months of age. Third, all ewe lambs and twin-baring ewes were lambbed in a confined area to match ewe to lamb at birth. Ewes scanned as 34% twins, 56% singles, and 11% open. Forty five percent of ewes that were scanned with twins in 2017 were scanned with twins in 2018. As would be expected, not all ewes are going to have twins every year, but the twinning rate was 15% higher for ewes that were scanned to have twins vs. a singleton the previous year.

At marking, the twin baring ewes reared a 120% lamb crop and the single baring ewes reared a 94% lamb crop. Dry conditions, and predation results in an overall lower lamb crop. Even so, the twin pasture marked a 27% higher lamb crop.

In summary, moving to a 150% lamb crop is a daunting challenge for commercial range producers that have limited data on their animals. However, this ranch in particular is highly motivated to make improvement in lamb crop-based participation in this project among a few other factors. The data provided via ultrasound has highlighted their flock reproductive inefficiencies and they are working diligently to make improvements. Preliminary data from this case study indicates this operation's genetic base and management system are moving towards an improved lamb crop.

## **Leading Edge Sheep Production – Part III**

### **AWARDED TO:**

Utah Leading Edge Group

### **SCOPE:**

Utah, Wyoming, Idaho, Nevada

### **SUMMARY:**

Goals for this proposal include:

1. Establish a Breeding/Production consortium group
2. Create a terminal sire breeding scheme and educate the group as to how the group needs to function
3. Provide project scope and insight into the terminal sire breeding and genetic plan including the creation of stabilized composites in large enough numbers to cover group demand
4. Introduce and discuss the basic components of a maternal breeding scheme
5. Consider the formation of a direct marketing/branded product program

### **STATUS:**

Complete.

### **FINAL REPORT:**

View the presentation provided during the 2017 ASI Convention at [Leading Edge Sheep Producers](#)

[Better Genetics Equals More Profit](#) ran in the November 2016 issue of the *Sheep Industry News*. Read more about the project through this article.

# **Increasing Annual Lamb Productivity through the Identification of Genes and Diagnostic for Selection of Out of Season Breeding**

## **AWARDED TO:**

Cornell University

## **SCOPE:**

Nationwide

## **SUMMARY:**

The genetic investigation of out of season breeding in sheep is aimed at identifying genes regulating the trait and diagnostic markers for use in selection programs. Marker assisted selection improves the accuracy and intensity of selection allowing farmers to make advances in out of season breeding more efficiently and effectively within their flock without the use of hormonal treatments or the necessity of waiting multiple breeding cycles. Genetic results from this research will be proposed for commercial assay development and extension efforts will be made by the researchers to disseminate information and application to producers.

## **STATUS:**

Complete.

## **FINAL REPORT:** [Final Report](#)

**PROGRESS REPORT:** Samples for this project were collected from three Polypay flocks with lambing records and varying success for out of season lambing. Due to sampling constraints, we were only able to sample 94 Polypay individuals instead of the originally proposed 120 from five flocks. Certain flocks we wished to sample did not record necessary information for our study or were utilizing environmental treatments to achieve aseasoonality.

Despite these challenges we genotyped 94 Polypay ewes and an additional 26 Dorset and DorsetxFinn ewes that were sampled from flocks that have selected for aseasoonality. Blood samples were collected on these individuals and DNA extraction was performed using standard protocols. The DNA was quantified and prepped for submission to Geneseek (Lincoln, NE) to run the samples on the Illumina Ovine HD SNP chip. This chip contains oligonucleotides to genotype 606,006 genetic markers in the form of Single Nucleotide Polymorphisms (SNPs) spaced across the ovine genome. This funding supported the genetic characterization of 120 ewes.

Once genotyping was completed and the genotypes received, we began the necessary quality control to prepare the genotypic data for further analysis. Two analyses were performed: Within-breed (Polypay) and Across-breed. The analysis was conducted using the Golden Helix SNP and Variation Suite genetic software package. Quality control measures to ensure the use of informative genetic markers were the same for both analysis and were the following: SNPs were excluded from analysis if the call rate was less than 0.9, minor allele frequency was greater than 0.05, or there were more than 2 alleles. Ewes were also removed from the dataset if their sample

call rate (genetic characterization) was less than 90% successful and they had 1 or less opportunities to breed out of season.

The Within-Polypay-breed analysis utilized 483,576 SNPs and 79 ewes after filtering using the above thresholds. Updated lambing information will be sought from flocks in spring 2018 to be able to utilize the animals that were currently excluded due to limited records. We treated the number of lambings out of season as our response variable in our models. Various inheritance models (dominant, recessive, or additive) were tested using both simple regression and a mixed-model approach. The recessive model with five Principal Components correcting for population structure had the best fit and yielded significant genetic associations to out of season lambing. This model has significant associations, after correcting for multiple testing, on chromosomes 7 and 16.

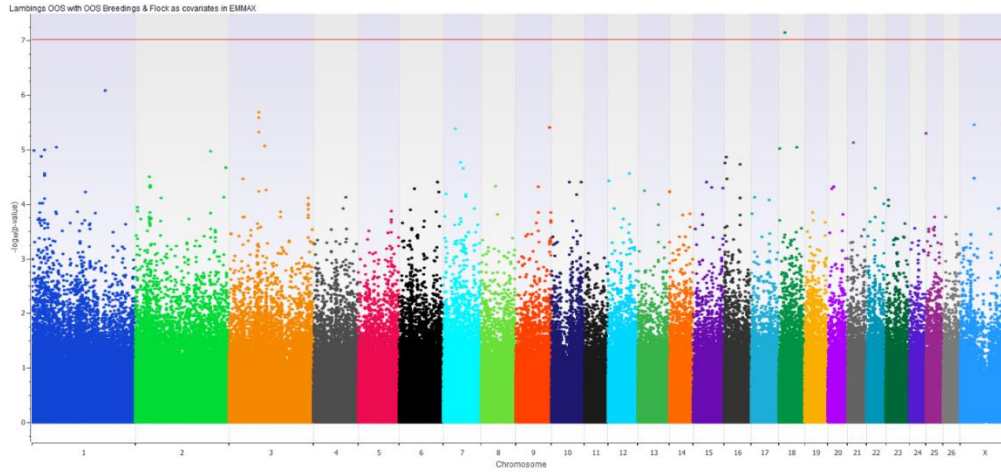
The Across-breed analysis utilized 527,139 SNPs after filtering and 257 ewes. This analysis utilized 89 Dorsets, 24 FinnxDorsets, 10 Dorset crosses, 3 Finnsheep, 52 Katahdin and Katahdin crosses, and 79 Polypay ewes. A mixed model was created to account for population structure using a marker-based kinship matrix. The recessive model again targeted lambings out of season and used the number of breedings out of season and flock as covariates yielded the most significant results. This included one SNP that remained significant after multiple testing correction, located on chromosome 18. A Manhattan plot of this association can be seen in Figure 1. This SNP lies in the gene, *AGBL1*, which has been implicated in Corneal Dystrophy in humans. The results from the Within-Breed and Across-Breed analyses are being finalized with regards to the proposal of candidate genes potentially effecting out of season lambing and the proposal of a genetic marker panel for use in genetic selection in the future.

#### Concluding Comments:

The across breed analysis results were presented at the 2017 NCERA-214 meeting in Lansing, MI. Acknowledgement of funding was made to ASI and the Let's Grow program at the end of the presentation. All future presentations and publications will continue to acknowledge ASI's support. The analysis and methodology will be published in peer-reviewed journals to disseminate results to the scientific community. Presentations at scientific and industry workshops will be used to further disseminate these research findings and potential for future application.

#### Looking Ahead:

We plan to continue analysis of this dataset and utilize additional genomic approaches such as Runs of Homozygosity to elicit more relationships between the genome and the ability to lamb out of season. These genotypes can serve as the beginning of reference populations to aid in the development of genomic breeding values for aseasonality. The candidate regions and genes related to aseasonality will be investigated further to improve our understanding of the biological regulation of out of season lambing.



Graduate student, Christian Posbergh, PhD candidate. This research is part of his thesis dissertation.



# **Expanding the Use and Application of Quantitative Genetics in the Polypay Breed**

## **AWARDED TO:**

American Polypay Sheep Association

## **SCOPE:**

Nationwide

## **SUMMARY:**

Participation in the National Sheep Improvement Program by purebred Associations, not just producers, is vital for the expanded use of quantitative genetics in the U.S. Sheep Industry. Purebred associations have the ability to provide leadership to producer groups with common goals and to adapt their respective sheep to meet the changing needs of the commercial sheep industry. As one example, it has been estimated that parasites alone cost sheep producers \$4.3 million per year in death loss. Our goal is to increase American Polypay Association membership enrollment and participation in the NSIP by 25%, from approximately 37 participants in NSIP currently, to 57 participants in 3 years. Additionally, we aim to increase sheep (sires and ewes) with EBV's for FEC from approximately 96 currently, to 3,000 in 3 years. This proposal could change the paradigm in the sheep industry through providing a pilot project that utilizes breed associations to support the goals of the American Sheep Industry

## **STATUS:**

In Process.

## **PROGRESS REPORT:**

Jerry Sorensen presents to the American Polypay Association the desire to develop NSIP EBVs for parasite resistance.



## Update on APSA Fecal Egg Count Project

Christopher S. Schauer

During the summer of 2016, the American Polypay Sheep Association (APSA) was awarded a grant from the American Sheep Industry Association *Let's Grow* grant program, with the goal of increasing the number of Polypay sheep with fecal egg count (FEC) National Sheep Improvement Program (NSIP) Estimated Breeding Values (EBVs). To accomplish this goal, the APSA is paying for the FEC evaluation of 1,000 lambs per year in 2016-2018 for registered APSA breeders, targeting 100 lambs per breeder per year from at least 10 flocks across the nation. In addition to providing breeders with a free FEC evaluation of their pasture raised lambs, the APSA is asking producers to collect blood cards on all of the sires from the lambs with FEC data collected. The outcome of these goals is an increase in the number of commercial and purebred rams with FEC EBVs that can be used in commercial operations across the U.S. If these goals can be met, the Polypay breed can be used as an example to other breeds on ways to decrease their reliance on chemical parasite control, while also addressing the problem of parasites resistance to conventional wormers.

For the 2016 growing season, the APSA paid for the testing of 767 lambs from 11 producers and 44 contemporary groups, while also collecting sire data and blood cards for potential future genetic research on DNA markers for parasite resistance. While the goal of collecting data on 1,000 lambs in year 1 was not met, we exceeded our goal of 10 producers participating in the program. We are confident that through the success of year 1, we will be able to test over 1,000 lambs in year 2. The result of these efforts in the 1<sup>st</sup> year is 66 sires and 364 dams with FEC EBVs, resulting in 518 ram lambs and 569 ewe lambs with FEC EBVs. Based on these values, it is estimated that 70% of the 2016 lambs with FEC EBVs are a direct result of the FEC grant program. In other words, a 240% increase over the number of lambs that likely would have been collected without the program! Additionally, there are likely producers not on NSIP that benefited from the collection of FEC data for selection on their own operation, as participating in NSIP is not a requirement for becoming part of the APSA FEC project.

The APSA will be conducting this program again during the 2017 grazing season. An information sheet has been included in the newsletter, with contacting information for the Project Coordinator as well as the rest of the project committee. Deliveries of supplies can occur at the APSA National Sale, the NSIP Sale, or by mail. Feel free to contact Christopher Schauer at [chris\\_schauer@yahoo.com](mailto:chris_schauer@yahoo.com) if you have questions.

# **GM1 Sheep Production for Huntington's Disease: Training Videos, Record Management and Cooperator Communications**

## **AWARDED TO:**

Dakota Lamb Growers Cooperative

## **SCOPE:**

Nationwide

## **SUMMARY:**

In December 2015, the ASI's Let's Grow "Second Round of Funding" Program funded a joint initiative (title: GM1 sheep production for Huntington's Disease) by Glycoscience Research Inc. and the Dakota Lamb Growers Co-op to create a series of educational outreach videos to be used to build awareness of the GM1 production project among sheep producers. These videos are intended to grow the participating numbers of cooperators, thereby providing a safe and plentiful source of GM1 ganglioside for therapeutic use for clinical trials in Huntington's disease (a fatal progressive genetic neurologic disease). The current proposal builds upon the previously funded project by providing detailed information for cooperating sheep producers participating in the GM1 project. Participating cooperators will be able to access training materials covering crucial techniques and record management; potential cooperators can learn details of the GRI's contract, genetic traits of the GRI rams, and care of the affected lambs. Record management is of particular importance to ensure the success of the GM1 project because the USDA requires strict records be kept for pharmaceutical tracking. A temporary Project Coordinator (paid internship) position is needed to manage the creation of the training video series; to create a record keeping system that will be used by the cooperator, DLGC and GRI in the tracking of lambs with GM1 genetics; and to develop a communication protocol to allow cooperators to coordinate blood sample collection and affected lamb deliveries to GRI for processing. Creation of both a robust record management tool and an effective communication protocol now will increase efficiency and productivity on all sides as all lambs-- normal, carriers and affected--enter the market stream after FDA approval for GM1 ganglioside use in humans.

## **STATUS:**

Completed

## **VIDEOS:**

### [Packaging Blood Samples](#)

<https://www.youtube.com/watch?v=5VSoSzUT37w>

### [Drawing Blood Samples All Ages](#)

<https://www.youtube.com/watch?v=4vRBgYOzGBk>

[Animal Identification Options](#)

<https://www.youtube.com/watch?v=2Cu1YvSnFE0>

**PROGRESS REPORT:** [Final Report](#)

## **NSIP Producer Profiles and Genetics Exchange Website**

### **AWARDED TO:**

National Sheep Improvement Program

### **SCOPE:**

Nationwide

### **SUMMARY:**

The NSIP Ram Buying Guide (funded by the first round of Let's Grow grants) has been well received by the industry. Configuring a searchable database will allow producers to utilize the tool more effectively when selecting rams based on estimated breeding values (EBVs) by providing a list of rams with the desired EBVs. Once developed, educating the industry on this new tool will take place at several ram sales where rams with EBVs for productivity improvement can have a substantial impact on the commercial industry.

### **STATUS:**

In Process.

### **PROGRESS REPORT:**

[November SIN story "NSIP adds searchable data base query"](#)

NSIP data query: <http://nsipsearch.nsip.org/#!/search>

### **NSIP PRODUCER PROFILES:**

Irish Acres' Story: <https://www.youtube.com/watch?v=XYtU1mSHfmY>

Helle Rambouillet Ranch: <https://www.youtube.com/watch?v=6VMuIPda27M>

Bonus Angus Farm: [https://www.youtube.com/watch?v=DM-h2n\\_LNCY](https://www.youtube.com/watch?v=DM-h2n_LNCY)

## **Business Tools for Success**

### **AWARDED TO:**

RightRisk, LLC

### **SCOPE:**

Nationwide

### **SUMMARY:**

This project will start with a Financial Needs Assessment Survey of sheep producers and continue with the Foundations for Better Business Management 2-week online lesson in the fall of 2016. The survey results and experience with the Foundations lesson will guide the development and delivery of a 10-week Business Tools for Success online module in the summer of 2017. In addition, the survey results will be summarized into a report for the ASI convention and two editions of RightRisk News will prominently feature articles directly related to the project. As a result of this project, sheep producers throughout the country will be better equipped to use business tools to make decisions, communicate with lending officers, and implement good business management practices.

### **STATUS:**

Complete.

### **FINAL REPORT: [Final Report](#)**

2016-17 Project Report

Date: September 11, 2017

Project Title: Business Tools for Success

This project resulted in a Financial Needs Assessment Survey of sheep producers and those interested in the sheep industry being conducted in the fall of 2016 to discern the best modes to present financial management educational material to producers. Respondents were pretty evenly split between online presentations, self-directed online courses, and in-person presentations or field days. There was a clear consensus that, if the educational opportunity was offered online, respondents preferred a series of 2-week modules spread out over a longer period of time rather than a single 10-week course covering the same material. On December 6, 2016, this project also resulted in The Foundations for Better Business Management webinar being offered online to a live audience of 31 people (61 people registered). Topics covered were common financial data sources for better business management, application of this data in business performance measures, and enterprise analysis. A two-week follow up learning module was offered online to webinar participants. Ten webinar participants registered for this two-week module and all of them participated to some degree but only two individuals followed through and completed the quiz at the end of the module. Finally, as a result of this project, two editions of RightRisk News prominently featured articles directly related to the project objectives. The June 2016 edition focused on determining business worth for a sample sheep operation and the January 2017

edition focused on the results of the Financial Needs Assessment Survey. The project team met in late May and early June 2017 to further analyze the results of this project and begin using them to design two more Let's Grow financial management learning modules to be offered later in 2017 on a subsequent Let's Grow project.

Report Submitted by: Jay Parsons

RightRisk, LLC

Contact Information:

Phone: 970-215-8043

Email: [jparsons@eRightRisk.com](mailto:jparsons@eRightRisk.com)

Address: 2601 S. Lemay Ste. 7-423, Fort Collins, CO 80525

## **Next Generation Wool Grower Program**

### **AWARDED TO:**

Montana Wool Growers Association

### **SCOPE:**

Montana

### **SUMMARY:**

There are three objectives to the Next Generation Wool Grower proposal:

1. Development of young producer group to facilitate enduring networking and information exchange that translates into best management practices and leadership in the sheep industry.
2. Facilitate adoption of novel management strategies via exchange programs to sheep operations throughout the region and Canada.
3. Develop an ongoing participant sheep enterprise database for participants to establish and monitor financial wellbeing and improve decision--making.

### **STATUS:**

In Process.

### **PROGRESS REPORT:**



## **Southwest U.S. Grass-based Pipestone Model Lamb Production**

### **AWARDED TO:**

Montgomery Sheep Farm

### **SCOPE:**

Southeastern U.S.

### **SUMMARY:**

With the challenges facing the contemporary sheep industry; there exists a unique opportunity to expand existing grass-based sheep production in the Southeast by replicating relevant aspects of the Pipestone model. With growing interest in “out of season” lambing through our cooperative production network, Sun-Raised Farms is positioned in the Southeast to take a leadership role to coordinate and grow network economies of scale working with similar genetics. With emphasis on further developing the production capacity and market timing of consistent and repeatable production.

Sun-Raised Farms is a 34-member wholesale livestock marketing network that specializes in grass based/pasture-raised lambs. Network members are small and medium-scale farmers some of whom farm full-time and others who work off-farm and raise lambs for supplemental income. All of our members live and work in North Carolina and represent diverse backgrounds, including Caucasian/European, African American, Hispanic and Native American heritage. We share a common goal to aggregate our supply and sell high-quality, AWA-approved, pasture raised lambs to a growing network of wholesale buyers. All of our members are experienced farmers and bring to this project their skills in raising livestock outdoors on pasture. Our members have learned over the years how to put aside their individual concerns or issues for the “greater good” of working together. We have developed skills in managing production and delivery schedules, attracting and retaining wholesale buyers, negotiating pricing, and trouble-shooting problems.

Breeding stock selection is a key determinant of lamb quality. Farmers need to make breeding decisions that balance the need for high yields (e.g., pounds marketed per ewe) and meat quality/eating experience. These characteristics are not automatically found together in currently available breeding stock /seed stock suppliers suitable for outdoor pasture-based production systems.

The goal of our project is to enhance our lamb quality and yield. To make progress toward our goal, we propose to contract with a lamb breeder(s) to raise ewes sired from different genetics using high quality NSIP registered rams with high parasite resistance.

This involves:

1. Selecting and purchasing desired sire(s)
2. Breeding selected ewes with sires
3. Raising lambs under consistent conditions and feeding programs

4. Measuring ADG (Avg Daily Gain) when moving lambs from pasture to pasture/farm to farm
5. Calculating feed efficiency and profitability
6. Collecting and analyzing forage tissue and feed samples
7. Conducting live animal observations of reproductive characteristics (e.g., sufficient leg length for natural breeding, days to maturity)
8. Slaughtering selected animals and evaluating meat quality characteristics

**STATUS:**

Complete.

**PROGRESS REPORT:**

View the presentation provided during the 2017 ASI Convention at: [Grass Based Pipestone in the Southeast](#)