

The North Dakota Sheep Industry

Newsletter

www.ndlwpa.com

A joint publication brought to you by the North Dakota Lamb and Wool Producers Association and the NDSU Extension Service

President's Corner

It's getting to be that time of year when we start to wrap up a multitude of projects that have been started throughout the year. I hope all of you have had a bountiful harvest and have plenty of grain, forages and straw laid in for the winter to come.

The Annual Convention is rapidly approaching. The convention will be held at the DOUBLEWOOD INN in Bismarck on November 20 and 21. (please note the change in location) Please preview the attached agenda for the event: on Friday evening we will hear presentations from the 4 graduate students who are doing research on sheep at NDSU, we will hold our 2nd Cook-off, have an auction (please bring items to sale) and have some spirits and a variety of things to eat. On Saturday we will have a program focusing on grazing, identifying mountain lion predation, Make It With Wool, a great noon lunch, introduction of Starter Flock recipients (we have 10 this year) and the annual meeting.

We were fortunate to receive some help from individuals interested in the Perpetual Flock program and this year we were able to award 10 flocks of 10 yearling ewes to young people around North Dakota. They also received an ASI Sheep Handbook and will be assigned a mentor to monitor their activities throughout the year and provide guidance and encouragement as needed.

We held our last Board of Directors meeting at NDSU. The new Sheppard is Skip Anderson, if you get a chance, say HI and visit with him. Skip is a graduate of NDSU. Dr. Greg Lardy has been named Department Chair of the Animal Science Department. Dr. Lardy is very interested in seeing our industry grow and has begun a search for the Sheep Extension Specialist position. I would like to thank him and the other administrators who have made this possible. In addition to the above, the facilities at NDSU are also undergoing a major remodel project.

Sheep are still one of the few commodities in agriculture that are profitable at this point. I hope all of work diligently in the coming year to recruit new members, promote sheep and maintain a positive attitude about the future of agriculture.

SEE YOU AT THE CONVENTION

Lyle Warner
NDLWPA President

Tentative Convention Schedule

Friday – November 20

6:00 PM “Sheep Graduate Students at the NDSU Hettinger Research Extension Center and the NDSU Department of Animal Sciences – Who They Are and What They Are Doing”

Bryan Neville – PhD candidate Animal Science
Megan Van Emon - PhD candidate Animal Science
Steven Eckerman – MS candidate Animal Science
Chelsey Saevre - MS candidate Animal Science

7:00 PM Lamb Cook-Off tasting and awards

8:00 PM Annual Auction

Saturday – November 21

9:00 AM “ Grazing Trials and Programs”

9:00 AM Educational Program for Young Sheppard's – Misty Stieke and Skip Anderson (for Perpetual Flock recipients and other interested individuals)

11:00 AM “Identifying Mountain Lion Attacks to Livestock” – Jeremy Duckwitz

11:30 AM

NOON Make it With Wool
Noon Luncheon
“Distinguished Service Award”

1:30 PM Starter Flock Presentation

Camden Hoffman, Medina
Bill Klose, Hoople
David Stroh, Tappen;
Stetson Ellingson, St. Anthony
Clay Hatlewick, Jamestown;
Mikenzie Elliot, Clifford
Davin Dockter, Medina
Becky Klose, Hoople;
Megan Ruch, Cogswell
Kaylie Ketterling, Wishek

1:45 PM ASI Report – Dean Swenson

2:15 PM Annual Meeting

Make your reservations early at the Doublewood Inn, 1-800-554-7077. There is a block reserved under “North Dakota Lamb and Wool Convention”. The cost is \$74 per night.

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Section 3

A. ANNUAL MEETING NOMINATING COMMITTEE shall consist of three members elected at the ~~last prior~~ Annual Meeting ~~and two members who are appointed by the President~~. The president shall designate the chairman ~~and make his appointments at least 180 days in advance of the convening of each Annual Meeting~~.

C. ANNUAL MEETING ELECTIONS

6. *The ASI director shall be elected at large annually by the members of the Association.*

Section 4: The BOARD OF DIRECTORS shall consist of the four elected officers, the eight elected directors, and the immediate past president. *The ASI state director*, the presidents of all auxiliary organizations, and the various state breed associations recognized by the Board of Directors shall be ex-officio members of the Board of Directors. These ex-officio members shall have the right to speak at meetings but not to vote.

Section 6 SALES ACTIVITIES

B. ELIGIBILITY – The manager or coordinator of any sale sponsored by the Association shall determine who is eligible to consign to the sale. Consignors ~~shall be encouraged to maintain membership in the Association, but the right to sell at any Association sponsored sale will not be guaranteed nor denied because of the consignor's membership or non membership in the Association.~~

C. SALE EXPENSE – ~~The consignors to various sales sponsored by the Association shall be responsible to see that the sale is at least a break even sale.~~ No funds collected by the Treasurer as membership fees shall be used to pay expenses of any sale.

North Dakota Lamb and Wool Producers Assn. Sept. 30th, 2009 NDSU Feed Mill Fargo, ND

Dr. Don Kirby addressed the board and introduced Dr. Greg Lardy as the new department head. Dr. Kirby also introduced Ben Williams to the board. Mr. Williams will be the new livestock judging coach. Dr. Kirby stated the animal science program has had much new enthusiasm.

Dr. Greg Lardy addressed the board and stated the extension specialist position will be posted in the near future and hopes to get the position filled soon.

Ben Williams introduced himself to the board and stated the judging team has attended four judging events already this year and are planning to attend many more.

Dr. Dale Redmer and Dr. Scott Walden addressed the board on the decertification of the Katadin flock. Dr. Redmer stated the decision was made to move the Katadin flock to the main sheep barn and remove them from the research facility on campus. In doing this they will no longer have their scrapie

free certification. Dr. Redmer also stated that they believe they can improve their scrapie resistance genetically over time to address the scrapie genotyping for the flock and would be customers.

Brent Kuss read the minutes from the Aug. 24th meeting. Luke Lillehaugen made a motion to accept the minutes as read. Brent Stroh seconded the motion. Motion carried.

Mark Sheppard presented the board with a treasurer's report. Matt Benz made a motion to accept the treasurer's report. Don Osborne seconded the motion. Motion carried.

New Business:

Hettinger Ram Sale: There was a consigners meeting after the sift, and a Hettinger Ram Sale committee was form. The committee will consist of Matt Benz, Lindi Peterson, Bob Amundson and Dave Pearson. The board had some discussion on the new committee. Matt Benz made a motion that the new committee's responsibilities would be to address the board with proposed changes and get board approval. Luke Lillehaugen seconded the motion. Motion carried. Some topics discussed were mailing out sale catalogs to all buyers and to adjust the sale average by the actual number of rams sold.

Shearing contest: Mike Higgins proposed to have a shearing contest at the state fair and asked that the NDLWPA board would go to the fair board to get approval and a place for the contest. Wyman Scheetz volunteered to help Mike Higgins approach the fair board.

Recruitment of new members: A committee was formed to address the possibility of having a membership drive. Wyman Scheetz-Chair, Brent Stroh, and Skip Anderson.

Starter Flocks: Matt Benz made a motion to reimburse Brent Stroh \$100 for wormer and the pre-breeding shots given to the yearlings for the starter flock program. Lyle Warner and Brent Stroh will work on lining up mentors for all the starter flock kids.

Treasurer position: Brent Stroh made a motion to pay Mark and Wanda Sheppard \$1000 for clerking the Fargo Ram and Hettinger Ram sales the last two years and for all the extra time they have had to dedicate to his position. Wyman Scheetz seconded the motion. Motion carried.

ASI Dues: Mark Sheppard stated our ASI dues are \$2520 for the year. Brent Stroh made a motion to pay the ASI dues. Luke Lillehaugen seconded the motion. Motion carried.

Old Business:

Annual Convention: Some of the events already slated for the convention are to have the PH. D and Masters students presently working at Hettinger Research Center give an introduction on what they are working on at Hettinger. Also Phil Mastrangelo will discuss identifying mountain lion kills. Other speakers are also being contacted.

Make it With Wool: Jane Horner sent the board a 2008-2009 budget. Matt Benz made a motion to give Make it With Wool an additional \$650. Todd Sears seconded the motion.

Discussion followed. Motion carried.

Board members in attendance: Brent Kuss, Wyman Scheetz, Brent Stroh, Don Osborne, Luke Lillehaugen, Matt Benz, Lyle Warner, Todd Sears, Mark Sheppard, Dean Swenson-ASI Representative, Special Guests: Dr. Don Kirby, Dr. Greg Lardy, Dr. Dale Redmer, Dr. Scott Walden, Skip Anderson, Ben Williams, and Justin Benz.

Hettinger Ram Sale Report

The NDLWPA again sponsored the Hettinger Ram Sale. This year's sale was held September 16th at the Adams County Fairgrounds. 105 rams sold at average of \$316.29.

13 Targees sold for an average of \$384.62 for the high breed average. Targees were followed by crossbreds at \$364.29 on seven head, 24 Rambouillet averaged \$330.21, 30 Suffolks averaged \$308.67. 3 Columbias and 2 Southdowns averaged \$300 followed by 2 Polypays at \$275 and 19 Hampshires averaging \$272.37. 2 Dorsets, 2 Ill-de-Franc and 1 Montadale rounded out the sale at a \$250 average.

The high selling ram of the sale was a Suffolk ram lamb consigned by Schmidt Suffolks of Center at \$600.

Fargo Ram Sale Report

The Fargo ram sale was held at NDSU Sheperd Arena on August 8th. 19 rams averaged \$294.74 while 11 registered ewes averaged \$215.91.

Dorsets led the sale average on rams with an average of \$330, followed by Hampshires at \$300, Polypays's and Suffolks at \$250. Columbias posted the high ewe average at \$233.33, followed by Suffolks at \$212.50 and Hampshires at \$206.25.

Body condition scoring of sheep

J. Thompson and H. Meyer

Throughout the production cycle, sheep producers must know whether or not their sheep are in condition (too thin, too fat, or just right) for the stage of production: breeding, late pregnancy, and lactation.

Weight at a given stage of production is the best indicator, but as there is a wide variation in mature size between individuals and breeds, it is extremely difficult to use weight to determine proper condition. Body condition scoring describes the condition of a sheep, is convenient, and is much more accurate than a simple eye appraisal.

A body condition score estimates condition of muscling and fat development. Scoring is based on feeling the level of muscling

and fat deposition over and around the vertebrae in the loin region (Figures 1-3). In addition to the central spinal column, loin vertebrae have a vertical bone protrusion (spinous process) and a short horizontal protrusion on each side (transverse process). Both of these protrusions are felt and used to assess an individual body condition score.

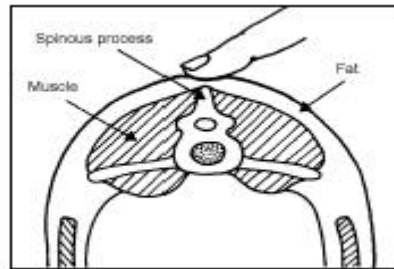


Figure 1.--Feel for the spine in the center of the sheep's back, behind its last rib and in front of its hip bone.

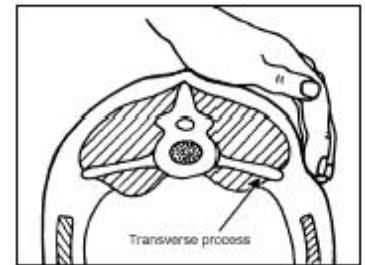


Figure 2.--Feel for the tips of the transverse processes.

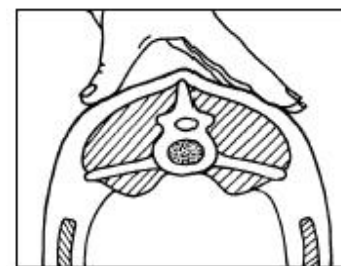


Figure 3.--Feel for fullness of muscle and fat cover.

The system used most widely in the United States is based on a scale of 1 to 5. The five scores (Figures 4-8) are:

Condition 1 (Emaciated)

Spinous processes are sharp and prominent. Loin eye muscle is shallow with no fat cover. Transverse processes are sharp; one can pass fingers under ends. It is possible to feel between each process.

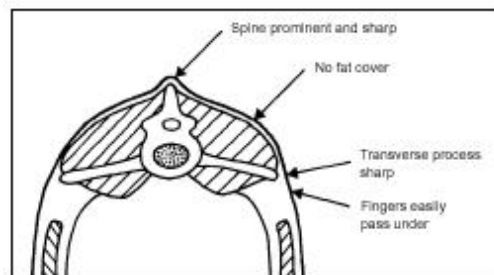


Figure 4.--Condition 1

Condition 2 (Thin)

Spinous processes are sharp and prominent. Loin eye muscle has little fat cover but is full. Transverse processes are smooth and slightly rounded. It is possible to pass fingers under the ends of the transverse processes with a little pressure.

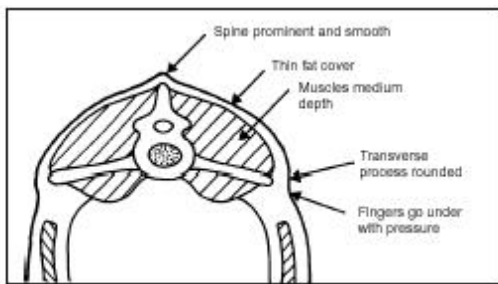


Figure 5.--Condition 2

Condition 3 (Average)

Spinous processes are smooth and rounded and one can feel individual processes only with pressure. Transverse processes are smooth and well covered, and firm pressure is needed to feel over the ends. Loin eye muscle is full with some fat cover.

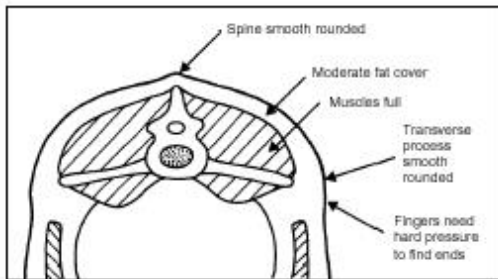


Figure 6.--Condition 3

Condition 4 (Fat)

Spinous processes can be detected only with pressure as a hard line. Transverse processes cannot be felt. Loin eye muscle is full with a thick fat cover.

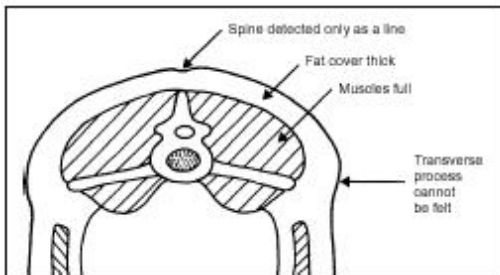


Figure 7.--Condition 4

Condition 5 (Obese)

Spinous processes cannot be detected. There is a depression between fat where spine would normally be felt. Transverse processes cannot be detected. Loin eye muscle is very full with a very thick fat cover.

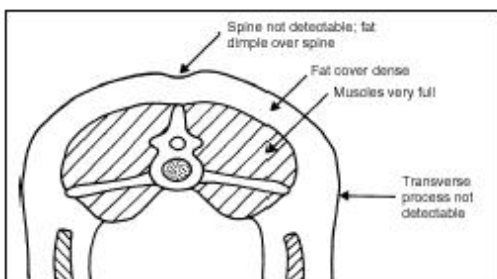


Figure 8.--Condition 5

The system contains everything from emaciated sheep to those that are grossly obese due to overfeeding or being nonproductive. In most typical sheep flocks, over 90 percent of the sheep should have a body condition score of 2, 3, or 4. It is recommended that half scores be used between 2 and 4, giving the following scores: 1, 2, 2.5, 3, 3.5, 4, and 5.

The intermediate half scores are helpful when an animal's condition is not clear. Keep in mind that placing an exact score is not as important as being able to assign a relative score. A body condition score of 3 versus a 3.5 is not such a big deal, but the relative difference between a 2.5 and 4 certainly is of concern.

Other than practical experience, there is little available research comparing condition scores with performance. The majority of the research reported has dealt with the relationship of body condition score at breeding to ovulation rate and subsequent lambing percentage. Generally, the better the body condition score at mating, the higher the ovulation rate and therefore the higher the potential lambing percentage. However, ewes with a condition score greater than 4 at breeding tend to have a higher incidence of barrenness. Ewes with a condition score less than 3 at breeding will be more responsive to the effects of flushing than those with condition scores at 3.0-3.5 at mating.

Two research trials conducted by Oregon State University found that ewe body condition score at lambing had an effect on total pounds of lamb weaned per ewe. Ewes with a body condition score of 3 to 4 at lambing lost fewer offspring and weaned more pounds of lamb than those with a condition score of 2.5 or less.

In one study, ewes with a body condition score of 4 at lambing had a total weight of lamb weaned per ewe that was 82 percent greater than ewes with a body condition score of 2.5. The total weight weaned was 113 pounds versus 62 pounds per ewe. The increase in total weaning weight was due to improved lamb survival and heavier weaning weights.

In the other study, there was a 33 percent difference in total weight of lamb weaned (64 versus 85 pounds per ewe) between ewes with pre-lambing body condition scores of 2.5 to 3.5. This increase in pounds of lamb weaned was primarily due to improved lamb survival for offspring from the ewes with the higher body condition score.

Some suggested (optimum) condition score values for the various stages of the production cycle are:

Production stage	Optimum score
Breeding	3-4
Early-Mid Gestation	2.5-4
Lambing (singles)	3.0-3.5
(twins)	3.5-4
Weaning	2 or higher

The scores suggested above should allow for optimum productivity in highly prolific ewes. On average, a difference of one unit of condition score is equivalent to about 13 percent of the live weight of a ewe at a moderate (3-3.5) body condition score. Thus, a ewe with a maintenance weight of 150 pounds

would need to gain approximately 20 pounds to go from a body condition score of 2.5 to 3.5.

Body condition scoring is a subjective way to evaluate the status of a sheep flock—a potential tool for producers to increase production efficiency in their flocks.

For further reading

Khan, K., H.H. Meyer and J.M. Thompson. 1992. Effect of prelambling supplementation and ewe body condition score on lamb survival and total weight of lamb weaned. *Proceedings Western Section American Society of Animal Science* 43:175.
Russel, A. 1991. Body condition scoring of sheep. In: E. Boden (Ed.) *Sheep and Goat Practice*. p 3. Bailliere Tindall, Philadelphia.

Prepared by James M. Thompson, Extension sheep specialist, and Howard H. Meyer, associate professor of animal sciences; Oregon State University. April 1994.

From the Sheep Pocket Guide

AS-989, May 1996

Roger G. Haugen, Extension Sheep Specialist

Prior to Lambing - Early Pregnancy (First 15 Weeks)

- Watch general health of ewes. If possible sort off thin ewes and give them extra feed so they can catch up.
- Feed the poor quality roughage you have on hand during this period, saving the better for lambing.
- An exception to the above is feeding pregnant ewe lambs. They should receive good quality roughages and grain (about 20 percent of the ration) during this period.
- Vaccinate all ewe lambs and new ewes in the flock with their second shot for Vibrio and EAE during midgestation.

Last Six Weeks Before Lambing

- Trim hoofs and treat for internal parasites.
- Six to four weeks before lambing, feed 1/4 to 1/3 pound grain/ewe/day.
- Shear ewes before lambing (with highly prolific ewes at least a month before is preferred). Keep feeding schedule regular and watch weather conditions immediately after shearing (cold).
- Vaccinate ewes for enterotoxemia.
- Control ticks and lice immediately after shearing.
- Four weeks before lambing increase grain to 1/2 to 3/4 pound/ewe/day (usually done immediately after shearing).
- Give A-D-E preparations to ewes if pastures and/or roughages are or have been poor quality.
- **Feed selenium-vitamin E or use an injectable product if white muscle is a problem. Caution! Don't do both.**

- Check facilities and equipment to be sure everything is ready for lambing.
- Two weeks before lambing increase grain to 1 pound per ewe per day.

Lambing

- Be prepared for the first lambs 142 days after turning the rams in with the ewes, even though the average pregnancy period is 148 days.
- Watch ewes closely. Extra effort will be repaid with more lambs at weaning time. Saving lambs involves a 24-hour surveillance. Additional help at this time is money well spent.
- Put ewe and lambs in lambing pen (jug) after lambing (not before).
- **Grain feeding the ewes during the first three days after lambing is not necessary!**
- Be available to provide assistance if ewe has troubles.
- Disinfect lamb's navel with iodine as soon after birth as possible.
- Be sure both teats are functioning and lambs nurse as soon as possible.
- Use additional heat sources (heat lamps, etc.) in cold weather.
- Brand ewe and lambs with identical number on same sides. Identify lambs with ear tags, tattoos or both.
- Turn ewe and lambs out of jug as soon as all are doing well (one to three days).
- Bunch up ewes and lambs in small groups of four to eight ewes and then combine groups until they are a workable size unit.
- Castrate and dock lambs as soon as they are strong and have a good start (two days to two weeks of age). Use a tetanus toxoid if tetanus has been a problem on the farm (toxoids are not immediate protection, it takes at least 10 days for immunity to build).
- Vaccinate lambs for soremouth at one to two weeks of age if it has been a problem in the flock.
- Provide a place for orphaned lambs. Make decision on what lambs to orphan as soon after birth as possible for the best success. Few ewes can successfully nurse more than two lambs.

Sheep Shearing School Set for Nov. 18-20

Plan to attend a sheep shearing school at the NDSU Hettinger Research Extension Center on Nov. 18-20.

If you are interested in learning more about sheep shearing, then plan to attend a sheep shearing school at the North Dakota State University Hettinger Research Extension Center on Nov. 18-20.

The topics to be covered are:

- Professional shearing patterns
- Tagging and eyeing
- Equipment maintenance and repair

- Wool handling and preparation

Instructors for the school are Curt Olson, a Montana professional sheep shearer, and Wade Kopren, a professional sheep shearer from South Dakota. Coordinating the school is Christopher Schauer, NDSU Hettinger REC director.

The school is open to those who have experience in sheep shearing and those who do not. To allow for one-on-one instruction, registration is being limited. The registration deadline is Nov. 14.

The registration fee is \$125 and should be sent to Sheep Shearing School, Hettinger REC, P.O. Box 1377, Hettinger, ND 58639. The fee includes tuition, a handbook and DVD.

For more information, contact Schauer at (701) 567-4323 or by e-mail at christopher.schauer@ndsu.edu.

The sheep shearing school is sponsored by the North Dakota Lamb and Wool Producers Association, NDSU Extension Service and NDSU Hettinger REC.

Mountain/Plains Sheep and Goat Conference Set for Nov. 14-15

Sheep and goat conference is an opportunity to learn about the latest information and management techniques.

Researchers and Extension Service professionals from Colorado, Montana, Nebraska, South Dakota, Wyoming and North Dakota will present information during the Mountain/Plains Sheep and Goat Conference set for Nov. 14-15 in Greeley, Colo.

The two-day event is an opportunity for sheep and goat producers to learn about the latest information and management techniques available in their industries.

Topics include:

- Targeted grazing using sheep and goats
- Using coproduct feedstuffs
- Growth efficiency – cost of gain
- Scrapie update
- Infectious causes of reproductive losses
- Goat management
- Biosecurity practices
- Zoonotic diseases of goats and the human risks
- Goat and sheep marketing
- Wool production
- Ram behavior

Hands-on demonstrations of several management practices, such as wool grading and meat goat selection, also will be held.

A trade show is scheduled in conjunction with the conference to give sheep and goat producers an opportunity to see the latest products that are available in their industries.

The registration fee is \$75 for adults and \$30 for youths. Brochure and registration forms are available on the Web at <http://mountainplainsheepandgoat.com/>.

Effects of arginine supplementation on reproductive performance in Rambouillet ewes (excerpts)

J.S. Luther¹, E.J. Windorski¹, J.S. Caton¹, G. Wu², J.D. Kirsch¹, K.A. Vonnahme¹, L.P. Reynolds¹, and C.S. Schauer^{3,1}

¹Department of Animal Sciences, North Dakota State University, Fargo, ND

²Department of Animal Sciences, Texas A&M University, College Station, TX ³Hettinger Research Extension Center, North Dakota State University, Hettinger, ND

The objective of the current study was to determine if supplementation with the amino acid arginine enhances ovarian function and reproductive performance in sheep. Since prenatal mortality represents a large portion of economic loss in the sheep enterprise appropriate strategies need to be developed for reducing lamb losses before birth. Arginine supplementation is proving to be an effective strategy to improve the number of lambs born per ewe.

Introduction

Reproductive performance is the largest determinant of income in the livestock enterprise. In sheep embryonic and fetal deaths during pregnancy account for 25 to 50% of the total number of fertilized ova (Inskeep et al., 2003; Dixon et al., 2007), and can lead to complete pregnancy losses or decreases in dam productivity. Even if prenatal losses do not occur, improper growth and development before birth can decrease immediate survival after birth (Moulet et al., 1956), alter feed efficiency (Greenwood et al., 2003), decrease carcass yield (Greenwood et al., 2001), and impair reproductive performance during later life (Da Silva et al., 2001; Martin et al., 2007). Clearly, the development of strategies for enhancing prenatal growth and survival in sheep could have a major economic impact.

The amino acid L-arginine is important for the synthesis of polyamines and nitric oxide, both of which are essential for proper development of the embryo and placenta. It is reasonable to hypothesize that supplementation with arginine would have beneficial impacts on prenatal growth and survival in ruminant livestock.

Gestating sows supplemented with arginine achieved a 22% increase in live piglets born when compared to non-supplemented sows (11.4 vs. 9.4, $P < 0.03$, respectively) (Mateo et al., 2007). In addition to these beneficial effects on prenatal survival, arginine treatment during late pregnancy increases transport of nutrients to the unborn lamb (Thureen et al., 2002) and enhances lamb birth weight (De Boo et al., 2005).

The objective the current study was to determine the effects of arginine supplementation on ovarian function, early reproductive losses and lamb birth weight in Rambouillet ewes.

Procedures

In April of 2008, Rambouillet ewes of a similar BW (68 ± 1.8 kg) and age (4.7 ± 0.32 yr) received a CIDR device for 12 d followed by a single injection of 400 IU PMSG. Thereafter, ewes were exposed to fertile rams at a ratio of 1 ram: 2ewes. From d 0 (estrus) to d 15 postestrus ewes received L-arginine HCl (equivalent to 27 mg of larginine/kg of BW, ARG, n =20) or saline (CON, n = 20) i.v. once daily. Daily blood samples were obtained from 5 ewes /group immediately after treatment(0 h) to assess progesterone(P4) concentrations and at -0.5, 0, 0.5, 1, 2, 4, 8, and 24 h on d 12 to determine circulating

concentrations of arginine in response to treatment. Ovarian hemodynamics (d 12) and reproductive losses (d 25 and 45) were determined with color-Doppler and B-mode ultrasonography techniques, respectively.

Results

On d 12 of pregnancy, serum concentrations of arginine (nmol/ml) were elevated in ARG vs. CON ewes at 0 ($P < 0.001$), 0.5 ($P < 0.001$), 1 ($P < 0.001$), 2 ($P < 0.005$), and 4 h ($P < 0.05$), but were similar ($P > 0.05$) at -0.5, 8 and 24 h (Figure 1). Resistance index in the ovarian artery was reduced ($P < 0.05$) on d 12 at approximately 4 h after treatment in ARG vs. CON ewes (Figure 2). Despite similarities in the number of corporalutea in those ewes that were blood sampled (ARG, 1.8 ± 0.20 and CON, 1.8 ± 0.20 CL/ ewe; $P > 0.05$), ARG ewes had greater ($P < 0.004$) P4 concentrations throughout treatment compared to CON ewes (Figure 3).

Treatment with L-arginine did not influence pregnancy rate (ARG, 55% and CON, 60%; $P > 0.05$) or the number of corpora lutea among all ewes studied (ARG, 1.8 ± 0.12 and CON, 1.8 ± 0.199 ; $P > 0.05$). However, ARG ewes had more ($P < 0.05$) embryos per ewe (Figure 4) and less CL not represented by embryos (0.18 ± 0.122 vs. 0.58 ± 0.155 , $P < 0.05$) compared to CON ewes at d 25 of pregnancy. As pregnancy progressed to d 45, ARG ewes continued to have more ($P < 0.03$) embryos present compared to CON ewes (Figure 4), and the difference in the number of CL not represented by embryos was even greater ($P < 0.03$) in CON (0.75 ± 0.227) vs. ARG ewes (0.18 ± 0.122). The overall proportion of ewes conceiving, but then exhibiting embryonic loss by d 45 of pregnancy was reduced in ARG vs. CON ewes (18 vs. 58%, respectively, $P < 0.05$).

Ewes treated with L-arginine gave birth to more lambs when compared to control ewes (ARG, 1.6 ± 0.16 vs. CON, 1.1 ± 0.16 lambs born per ewe), but average lamb birth weights were not affected (ARG, 10.9 ± 0.32 and CON, 10.7 ± 0.18 lbs.).

Discussion

This is the first study to demonstrate that reproductive losses can actually be prevented with supplementation of the amino acid arginine during early pregnancy. Ewes receiving arginine from the time of standing estrus to d 12 of pregnancy lost fewer embryos during early pregnancy and ultimately gave birth to more lambs per ewe. Mateo et al. (2007) observed similar results when gestating sows were supplemented with arginine. Sows supplemented with arginine achieved a 22% increase in

live piglets born when compared to non-supplemented sows (11.4 vs. 9.4, $P < 0.03$, respectively). The latter results may be due to an increase in nutrient delivery to the developing embryo/fetus.

In the current study, it would appear that treatment with arginine enhanced the early uterine environment making it more ideal for embryonic survival. Ewes treated with arginine had higher concentrations of progesterone, a hormone necessary for maintaining pregnancy. Several studies have shown that low levels of progesterone can lead to a greater incidence of embryonic loss in sheep and ultimately result in decreases in ewe productivity. Progesterone is necessary for the secretion of histotroph by uterine glands during early pregnancy (Spencer et al., 2001), which is important for early embryonic growth and development. Increases in progesterone production may have resulted from greater ovarian function in ewes

supplemented with the amino acid arginine. Arginine is important for many biological functions, including the synthesis of nitric oxide, a chemical important for dilating blood vessels and increasing tissue blood flow. Increases in ovarian blood flow and/or vascular perfusion of the corpus luteum (structure responsible for progesterone production during early pregnancy in sheep) probably resulted in higher concentrations of progesterone in ewes treated with arginine. In summary, early reproductive losses can be prevented, at least in part, by treatment with arginine. Decreased ovarian vascular resistance and increased concentrations of progesterone may merit for early embryonic survival.

Implications

Although a more suitable delivery method must be developed, the current results imply that embryonic survival in sheep can be enhanced when L-arginine is supplemented during early pregnancy. We are currently evaluating a rumen protected source of arginine for enhancing embryonic survival and ultimately ewe productivity. In the near future it may be possible to include a rumen protected source of arginine in your breeding ewe ration at a relatively low cost.

NDLWPA Membership Form

This form is a membership application for the North Dakota Lamb and Wool Producers Association (NDLWPA) and American Sheep Industry (ASI) Association

Please Print Clearly

Name: _____

Street Address: _____

City: _____

State: _____

Zip: _____

Phone: _____

Fax: _____

Email: _____

No. of Sheep/Goats: _____

Please check all that apply: Commercial Purebred Club Lamb Dairy

Lamb Feeder Shearer Allied Industry Business

Please check membership type:

- NDLWPA Annual Membership - \$20
 NDLWPA Annual Junior Membership (under 18 years of age) - \$5
 ASI Annual Membership - \$.04/head or \$25 minimum (whichever is greater)
 Joint NDLWPA/ASI Annual Membership - \$40
 Hardcopy of the ASI Weekly Newsletter - \$10

Note: ASI Annual Membership will automatically get you an email copy of the ASI Weekly Newsletter.

Total: _____

Please make checks payable to: NDLWPA

Send this application and your payment to: NDLWPA
9463 86th St. SE
Fullerton, ND 58441

Form more information call: 701-375-6971 or visit: www.ndlwpa.com

Thank you for taking an active interest in your industry!

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