Feeding and Producing Sheep for Maximum Fiber Production – Is it Realistic?

Presenter: Dr. Nancy Irlbeck
Colorado State University

Host/Moderator: Jay Parsons

September 10, 2013

This webinar is being offered in cooperation with the American Sheep Industry Association Rebuild the Sheep Inventory Committee.
Pig
Farmer’s Daughter
Comparative Nutritionist

Silver Moon
Romeldale CVM
Wensleydale
Karakul
What do you look for in good fiber?
1. Low Micron Count
2. Fleece Weight
Shrek Merino
OMG-Facts.org
Feeding and Producing Sheep for Maximum Fiber Production – Is it Realistic?

Presenter: Dr. Nancy Irlbeck
Colorado State University

Host/Moderator: Jay Parsons

September 10, 2013

This webinar is being offered in cooperation with the American Sheep Industry Association Rebuild the Sheep Inventory Committee.
Factors Affecting Fiber

1. Genetics
2. Environment

http://www.jsba.org/
Coarse wool

Fine wool

Cashmere goat

Mohair – Angora Goat

Yocum-mcColl

http://www.ymccoll.com/fibers.html
1. Fine merino wool
2. Typical wool fiber
3. Chinese sheep wool

http://www.gutenberg.org/files/17740/17740-h/17740-h.htm
Fiber Microscopy

http://www.ymccoll.com/fibers.html
Follicles Are Actually An Extension Of The Skin

http://www.vetmed.vt.edu/education/curriculum/vm8054/labs/lab15/lab15.htm
Maximum # of follicles that a lamb can form is determined genetically.

Actual # of follicles formed is controlled by the environment.
PRIMARY FOLLICLE = sweat gland; arrector pili muscle (APM) and a sebacious gland

Sebacious = lanolin

SECONDARY FOLLICLE = only sebacious gland
Factors Affecting Fiber

1. Genetics
2. Environment

http://www.jsba.org/
Factors Affecting Fiber

1. GENETICS
2. Environment

http://www.jsba.org/
Rare for a pasture sheep to reach maximum genetic potential for wool production.
Consistent Selection of One Trait Increases Risk of Negative Traits

Selecting for fiber fineness decreases the body size and fleece weights.
PSE
Factors Affecting Fiber

1. Genetics
2. ENVIRONMENT

http://www.jsba.org/
1. First 50 days of pregnancy – Minimal fetus or placenta growth

2. Day 50-100 – Rapid Placenta Growth

3. Day 100-150 – Rapid Fetal Growth
Physiological Status

- Growth
  - Neonate vs Early vs Late
- Flushing
- Gestation – 1st 2/3 vs last 1/3
- Lactation – Early vs Late
- Maintenance
Non-Pregnant Status
88 Days Of 150 Days Gestation

Mid Second Trimester
112 Days Of 150 Days Gestation

Early Third Trimester
123 Days Of 150 Days Gestation
Mid-Third Trimester
Physiological Status

- Growth
  - Neonate vs Early vs Late
- Flushing
- Gestation – 1\textsuperscript{st} 2/3 vs last 1/3
- Lactation – Early vs Late
- Maintenance
PRIMARY FOLLICLE = sweat gland; arrector pili muscle (APM) and a sebacious gland

Sebacious = lanolin

SECONDARY FOLLICLE = only sebacious gland
Primary Follicle Development  
Day 60 to Day 90 of Gestation  
Secondary Follicle Development  
Day 90 to Birth  
Density of follicles is determined prior to birth and will not change

Genetics X Nutrition
Genetics

Primary follicles begin form in skin of fetus between day 50-70 (90) of fetal development

Environment - Nutrition

Secondary follicles form after day 90 of fetal development
NUTRITION IMPACTS

1. Pre-weaning
   Pregnancy
   Lactation

2. Post-weaning

http://www.jsba.org/
Shrek Merino
OMG-Facts.org

Fine wool greater impact From Nutrition!!
If poor nutrition during pregnancy & lactation will impose permanent limitation for wool production

Lambs whose dams are poorly fed = less 2\textsuperscript{nd} follicle development

Progeny of young ewes = less 2\textsuperscript{nd} follicle development

Twin lambs = less 2\textsuperscript{nd} follicle development
Single Lamb

Multiple Lambs
Single Lamb

Ultrasound?

Multiple Lambs
Cost of that 2nd lamb?
Therefore pre-weaning environment is critical for realizing genetic potential of an individual sheep
Reduction in nutrition during development will significantly impact development of and final density of 2nd follicles.

High 2nd follicle density associated with decreased fiber diameter and higher fleece weight.

2nd fibers contribute the majority of fiber to adult wool fleece.
Factors Affecting Fiber Diameter

1. Age of animal
2. Sex of animal
3. Level of nutrition
What do you look for in good fiber?
1. Amount of wool
2. Low Micron Count
Progeny clean fleece weight is affected by ewe nutrition from early to mid-pregnancy.
Late pregnancy nutrition effects progeny fleece weight

![Graph showing the relationship between clean fleece weight and condition score change (Day 90 to 150). The graph compares single and twin lambs.](www.lifetimewool.com.au)
Progeny fibre diameter is affected by ewe nutrition from early to mid-pregnancy.
Late pregnancy nutrition effects progeny fibre diameter

Fibre diameter (micron)

-1.0  -0.8  -0.6  -0.4  -0.2  0.0  0.2  0.4
Condition score change (Day 90 to 150)

Twin lambs
Single lambs

www.lifetimewool.com.au
Physiological Status

- Growth
  - Neonate vs Early vs Late
- Flushing
- Gestation – 1\textsuperscript{st} 2/3 vs last 1/3
- Lactation – Early vs Late
- Maintenance
## 154# Ewe – Ca & P Requirements

<table>
<thead>
<tr>
<th></th>
<th>Grams Ca</th>
<th>Grams P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maint</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; 15 weeks</td>
<td>3.5</td>
<td>2.9</td>
</tr>
<tr>
<td>Flushing</td>
<td>5.7</td>
<td>3.2</td>
</tr>
<tr>
<td>Gest 130-150 vs 180-225</td>
<td>6.2/7.6</td>
<td>5.6/6.4</td>
</tr>
<tr>
<td>Lactation s/t</td>
<td>9.3/11.0</td>
<td>7.0/8.1</td>
</tr>
</tbody>
</table>
1st Cutting

3rd Cutting
Coarse Grind

Fine Grind

CRACKED
2.45 mm

FINE GROUND
.89 mm
Creep
Heated Water
Caution with Sheep & Copper!

25 ppm =
Copper Deficiency = Achromotrichia
10:1 Cu:Mo
Other Species Minerals?
Block or Loose Salt?
Overfeeding Creates Coarse Wool!!
Feeding and Producing Sheep for Maximum Fiber Production – Is it Realistic?

Presenter: Dr. Nancy Irlbeck
Colorado State University

Host/Moderator: Jay Parsons

September 10, 2013

This webinar is being offered in cooperation with the American Sheep Industry Association Rebuild the Sheep Inventory Committee.
Questions?!