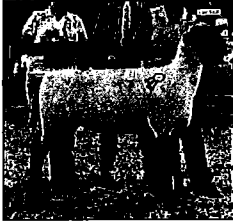


## Breeding Sheep Evaluation



## Goals of Sheep Producer

- Flock composed of ewes that efficiently convert forage to pounds of lamb and wool
- Produce fast growing, efficient lambs
- Market lambs yield heavy muscled, lean carcasses
- Sheep adaptable to environment and management changes

## Priorities for Breeding Sheep Selection

- Functionality
  - Brood Ewe Potential
- Growth and Extension
- Balance and Eye Appeal
  - Femininity
- Muscle
- Breed Character

## Functionality

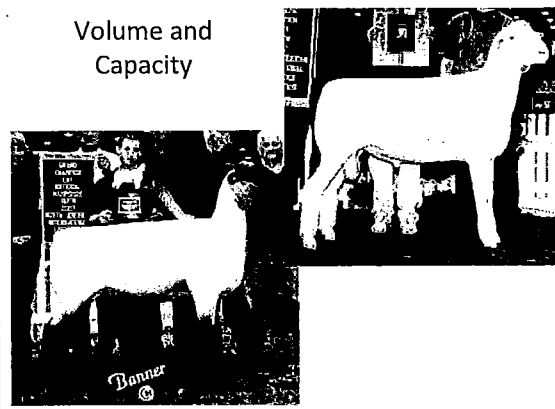
- Structural correctness and fleshing ability
- Major factor in breeding animals, but in sheep they must be adequate in growth as well
- Ability of dam to produce progeny in a cost efficient, productive, industry acceptable manner



## Functionality

- Brood Ewe Potential
  - Volume/Capacity
    - 3 dimensions (length, depth, spring of rib)
  - Fleshing Ability
    - Internal capacity and dimension
    - Openness thru chest, boldness to ribcage, and depth of body
    - Low maintenance in pasture/range setting with minimal supplement

## Volume and Capacity



## Functionality

- Brood Ewe Potential
  - Structural Correctness
    - Correct skeletal make-up allowing proper form and function
    - Correct joint angles
      - Shoulder, knee, hock and pastern
    - Proper front end
    - Level/correct topline and hip
    - Adequate circumference of bone

## Structurally Correct Ewe

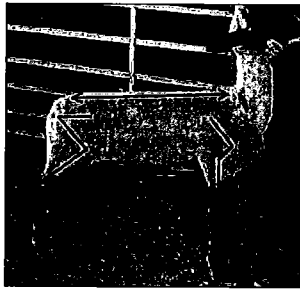


Tight shape at top of shoulder

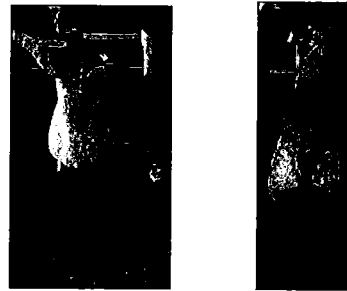
Smoothness of shoulder

Smooth blend from neck to foreleg

## Structurally Correct Ewe



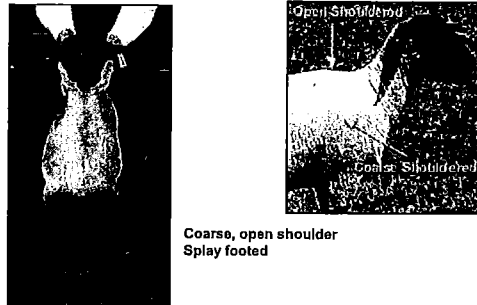
## Structurally Correct Ewe



## Structurally Correct Ram

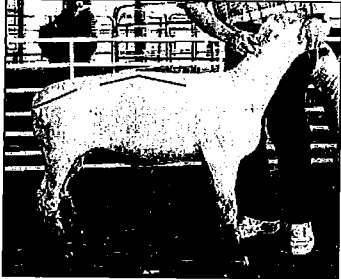


## Structural Incorrectness



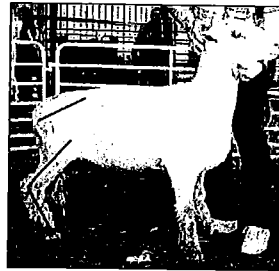
Coarse, open shoulder  
Splay footed

### Structurally Incorrect Ram



Steep rump    Roached top  
Straight shoulder

### Structurally Incorrect Ram



Sickle hocked    Sloped rump

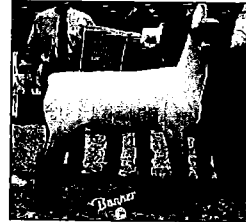
### Frame and Extension

- Indicator of genetic ability to transmit growth and late maturity pattern to offspring
  - Length of bonework
  - Length of topline
  - Front-end extension
  - Long fronted/necked and long bodied desired
- Breeding sheep should excel in weight per day of age
- Larger framed sheep
  - Later maturing and stay leaner
  - Growthlier
- Early maturing sheep UNDESIRABLE!
  - Short necked
  - Coarse made
  - Short bodied



### Reproductive Correctness

- Developed vulva on females desired
- Correct testicle development and shape on males



### Balance and Eye Appeal

- How well the pieces fit together
  - Symmetry and proportionalism of animal from profile
- Extension and length plus strength of skeleton aid in balance
  - Shape and smoothness of shoulder
  - Strength behind shoulder and at hip-loin junction
  - Levelness of hip
- Refinement of head and neck
- Ewes
  - Attractiveness
  - Femininity

### Muscle

- Muscle is important factor in any food animal
  - More Important in rams
    - Esp. sire breeds
  - Lesser importance in females
    - How muscles arranged may be of greater concern
  - Evaluated in similar locations as market lambs



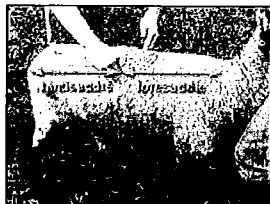
Light muscled



Heavy muscled

## Muscle

- Great percentage of lamb's weight should be in the hindsaddle
  - Leg and loin
- Deep, wide loin
- Expressive forearm



## Mouth Structure

- Jaw defects
  - Highly heritable
  - May prevent sheep from obtaining adequate forage in a pasture
  - Parrot mouth – overshot jaw
  - Monkey mouth – undershot jaw

## Breed Character

- Relation of type to that of breed ideal
- Emphasized more in sheep than any other species
- Subjective evaluation in many breeds

## Suffolk Breed Character

- Black, hornless head and legs free from wool
- Long, smooth, roman nose
- Long, smooth, pendulous bell-shaped ear
- Fleece free of dark fiber



## Hampshire Breed Character

- Moderate length and thick ears, covered with a coarse dark brown or black hair and free of wool
- Dark face, free from wool on face
- Unbroken wool cap extending from the over the forehead
- Legs free of wool



## Breed Character

- Medium Wool Breeds
  - Southdown
    - Smaller framed relative to other breeds
    - Mousey brown head and lower leg
- Fine Wool Breeds
  - Rambouillet
    - Hardy, fast growing breed
    - White face and legs
    - Excellent wool quality



## Evaluating Sheep Performance Records

## Types of Sheep Production

- Purebred
  - Focus on the sale of seedstock to other purebred breeders and commercial producers
- Commercial Producers
  - Maintains crossbred flock for the production of market lambs

### Breeds Used in U.S. Sheep Production

- “Ram” Breeds (Meat type)
  - Suffolk
  - Hampshire
  - Southdown
  - Shropshire (dual as wool breed)
  - Oxford – heavy fleece also
- “Ewe” Breeds (Maternal)
  - Dorset (dual as meat type)
  - Cheviot (dual as wool)



Southdown



Oxford

<http://www.ansl.okstate.edu/breeds/sheep/>

### Breeds Used in U.S. Sheep Production

- Wool Breeds
  - Rambouillet
  - Merino
  - Columbia (dual as maternal)
  - Corriedale (dual as meat type)
  - Montadale (dual as meat type)



Rambouillet



Corriedale



Montadale

## Crossbreeding Systems

- Rotational
  - At least 2 breeds used in rotation to produce replacement ewes and market lambs
- Terminal
  - A “meat-type” breed mated to a “maternal-type” breed for the production of market lambs
- Rotaterminal
  - A flock with both a rotational and terminal component

## Sheep Performance Records

- National Sheep Improvement Program (NSIP)
  - Established in 1986
  - Computerized genetic evaluation
- Types of records
  - Individual Data: Actual and Adjusted
  - Ratios and Indexes
  - Flock EPDs and EPDs

### Flock EPDs (FEPDs)

- Available for both purebred and commercial producers
- Can only be used on a within-flock basis
- Reported in units consistent with the trait being evaluated

### Flock EPDs

- Maternal traits
  - Number of lambs born
  - Pounds of lamb weaned per ewe exposed
- Growth traits
  - Weights at 30, 60, 90, 120, 180, or 360 days of age
    - Each producer can select up to 3 of these weights
- Wool Production
  - Fleece weight
  - Staple length
  - Fiber diameter

### FEPDs

| Ram | Flock EPDs |            |               |                |               |
|-----|------------|------------|---------------|----------------|---------------|
|     | Lambs Born | Lbs Weaned | 60-day weight | 120-day weight | Fleece weight |
| A   | +0.20      | +4.0       | +1.0          | -2.0           | +0.50         |
| B   | -0.10      | -1.0       | +5.0          | +12.0          | -0.75         |

Ram A should sire slower growing lambs that will, on avg, weigh 4 pounds less at 60 days and 14 pounds less at 120 days compared to lambs sired by Ram B. Ram A's offspring would be expected to produce 1.25 pounds more fleece weight and have a higher twinning rate, producing 5 more pounds of lamb at weaning than Ram B's daughters.

### EPDs

- In order to calculate EPDs, flocks must be genetically tied through related individuals in several flocks
- Suffolk and Targhee breeds have developed the first across-flock genetic evaluations and sire summaries
- Development of EPDs for other breeds will be enhanced by AI and records turned in to NSIP

### NSIP – Maternal Trait EPDs



- Percent Lambcrop
  - Number of lambs born per ewe lambing
- Maternal Milk
  - Evaluate milk production
  - Reported as pounds of lamb at weaning
- Milk + Growth
  - Reported as pounds of lamb at weaning
  - Estimates the total merit of an animal's daughters for 60 day weaning weight production

### Sheep Growth Traits

- Weaning Weight (WW) – pounds
  - Reflects the milk producing ability of the ewe
  - Corrected to standard age – 60 or 90 days
  - Adjusted for sex, type of birth and rearing, and age of dam
- 120-day Postweaning Weight – pounds
  - Identifies lambs that have the ability to grow on their own
- Yearling Weight - pounds

### Suffolk Rams

|   | %LC  | WW   | 120 d | MM   | M&G  |
|---|------|------|-------|------|------|
| 1 | +3.2 | +2.1 | +4.3  | +1.3 | +1.4 |
| 2 | -1.5 | -0.3 | -2.1  | -1.1 | -1.3 |
| 3 | +0.8 | +3.1 | +4.9  | +0.1 | +1.7 |
| 4 | -3.2 | -1.1 | +3.0  | +0.2 | +0.4 |

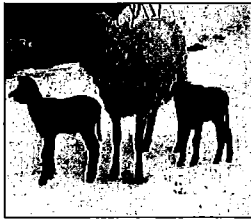
Which ram should sire the fastest growing offspring?  
Which ram should sire the heaviest milking daughters?

### Suffolk Rams

|   | %LC  | WW   | 120 d | MM   | M&G  |
|---|------|------|-------|------|------|
| 1 | +3.2 | +2.1 | +4.3  | +1.3 | +1.4 |
| 2 | -1.5 | -0.3 | -2.1  | -1.1 | -1.3 |
| 3 | +0.8 | +3.1 | +4.9  | +0.1 | +1.7 |
| 4 | -3.2 | -1.1 | +3.0  | +0.2 | +0.4 |

Which ram should make the most improvement on the number of lambs weaned?  
Which 2 rams are the poorest suited for use in a purebred flock?

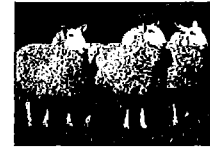
### Type of Birth and Rearing Adjustments



- Single
- Twin – raised as Twin
- Twin – raised as Single
- Triplet – raised as Triplet
- Triplet – raised as Twin
- Triplet – raised as Single

### Wool Traits

- Usually taken at one year of age on a full year's growth of wool
- Grease Fleece Weight – pounds
- Fiber Diameter (Fleece Grade) – microns
- Fiber Length - inches



### Example Scenarios

#### Suffolk rams

Rank these rams to be used as terminal sires on white-faced, crossbred ewes. All lambs are fed to slaughter.

#### Priorities

- 120-day weight
- Post-weaning gain
- Leanness and muscling
- Moderate consideration on multiple births, along with 30 and 60 day weights

### Example Scenarios

#### Dorset Rams

Rank these rams to be used in the purebred farm flock. Ewe lambs are kept as replacements and wethers are sold as club or feeder lambs. The top percentage of rams sold to other flocks. Feed and labor resources are high.

#### Priorities

- Balance of traits
- 60-day weight
- Twinning
- Moderate emphasis on growth rate and muscle

### Scrapie

- An infectious disease in sheep affecting the central nervous system
- Always fatal
- Is a TSE much like BSE in cattle
- Amino acid changes at 3 locations on the sheep prion protein molecule have been shown to confer increased or decreased susceptibility to scrapie
  - Codons 136, 154, 171

### Scrapie

- Codon 171
  - Amino acid changes here have large effect on scrapie susceptibility
    - Most common amino acids: Glutamine (Q) or Arginine (R)
  - Nearly no sheep homozygous for arginine (RR) have been identified with scrapie
  - Heterozygous (QR) sheep infrequent among scrapie-infected sheep
  - Frequency of sheep homozygous for glutamine (QQ) is very high among scrapie-infected sheep

### Scrapie

- QQ is a *susceptible* genotype
  - Scrapie is not a genetic disease
  - Both an infectious agent and susceptible genotype must be present to have scrapie
- 90% of scrapies cases are in the Suffolk breed
- Selection for resistant genotypes need only be conducted in breeds where scrapie is found (i.e. Suffolks)
- Selection for the arginine (R) allele at codon 171 is sufficient