

Selecting for Udder Conformation

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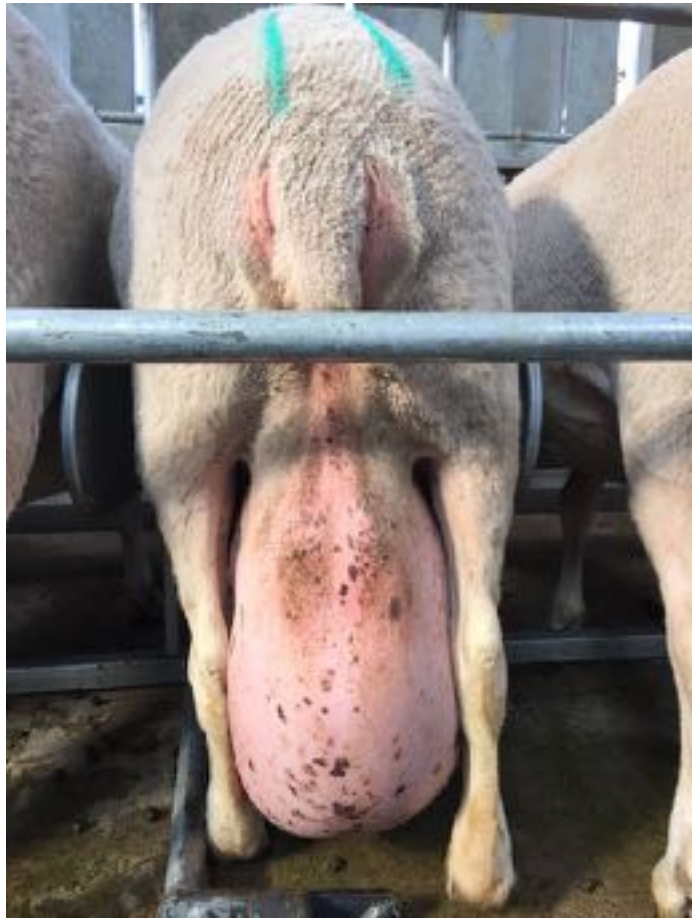
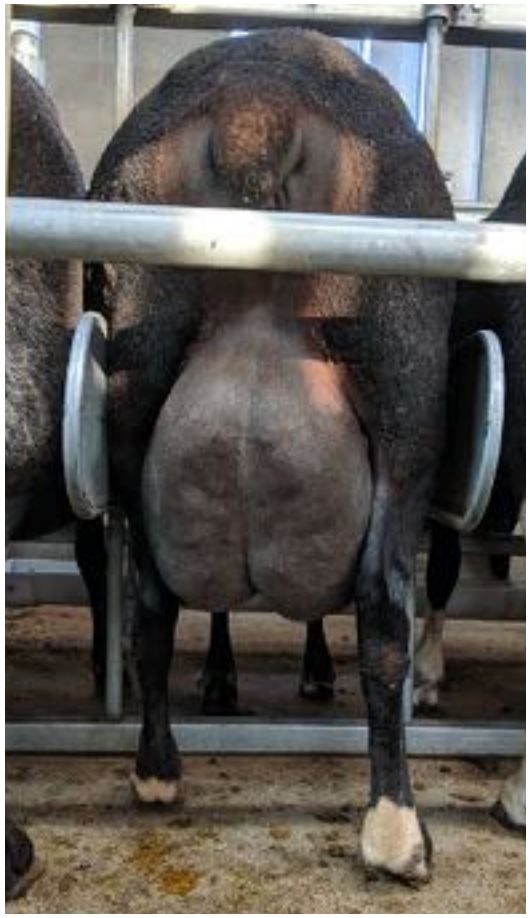
What are we going to cover today?

1) Why does udder conformation matter?
2) What traits do we need to consider whe breeding dairy sheep?
3) How heritable are these traits?
4) How do we choose rams for our flock?

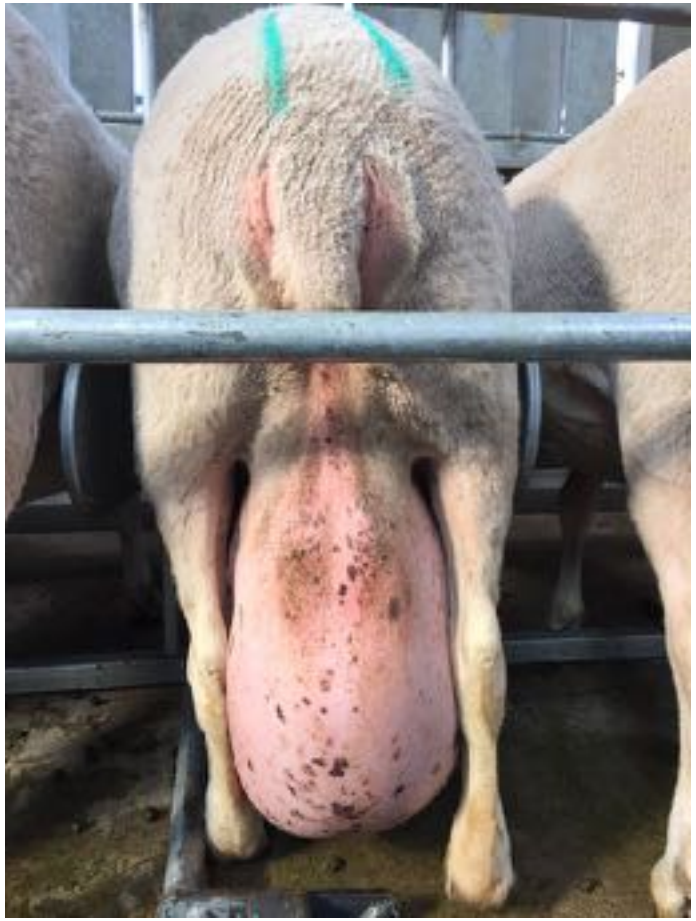
Is udder conformation the same as milk production?



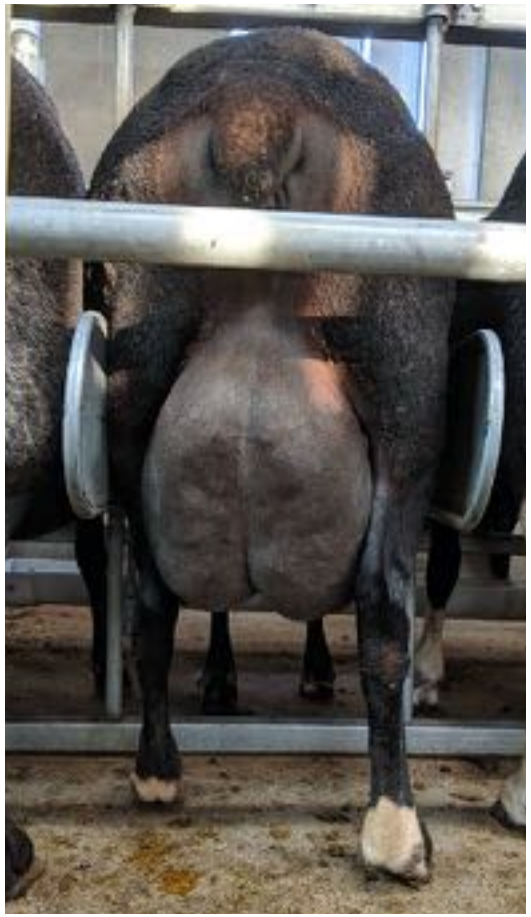
NO



Is udder conformation correlated to lifetime production?



YES



We are talking about conformation as it pertains to dairy & economic efficiency

1) Easy to milk = proper teat placement and size

2) Udder stays at or above the hock = median suspensory ligament

3) Udder has ‘capacity’ = fore and rear udder attachments

4) Udder texture- fibrous, fatty, or ‘milks down to nothing’

How do economics affect udder conformation?

1) Less labor to milk the ewes
2) Ewes live in our flocks for a long tim
3) More milk per ewe
    1) Per lactation
    2) Over the ewe's lifetime

Photo from Caroline Williams @ Oddstuff.com

Are there ethical or humane concerns?

Costs related to raising replacements

- A fresh yearling will spend her first lactation **paying back the costs** related to her life as a lamb
- It is not until the beginning/middle of the second lactation that a ewe becomes profitable
- Ewes with only 2 lactations generate very little income
- Ewes become very profitable for farms at their 3rd lactation

What are the goals?

- Breed ewes that produce high milk volume for 3+ lactations
- Raise lambs from the best ewes
- Cull ewes with poor udder conformation
- Cull ewes with poor milk production

The risks related to raising replacements:

- Poor lamb rearing selects for poor production
  1) High death loss in lambs negates the use of valuable ram genetics
  2) High multiples = smaller lambs = higher death loss in smaller lambs
  3) Milk production in ewes is linked to larger litter size
  4) High producing ewes- more 3+ litters
  5) Low producing ewes- more singles

- Singles survive the best on farms with poor lamb raising skills
- High production ewes have large litters

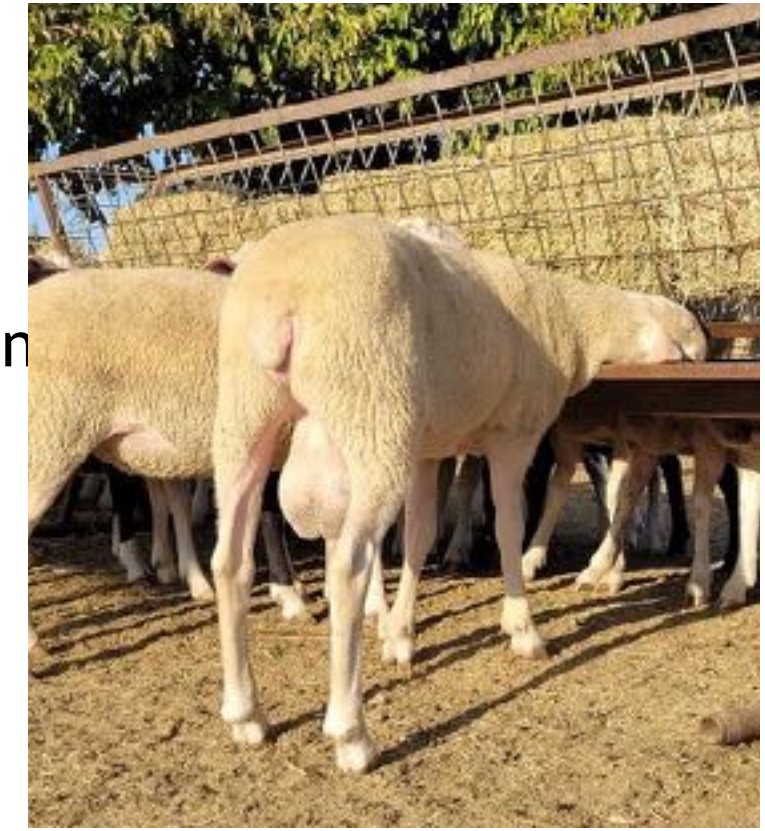
What do we need to know when creating selection criteria?

1) The trait we want to ‘manage’
2) The heritability of the trait

FORM & FUNCTION MATTER!!

How do you consider udder conformation in selecting sires?

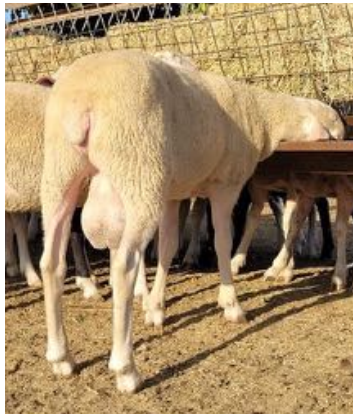
1) Evaluate udder of dam
2) Evaluate age of the dam
    1) What can you say about her productive life?
    2) What was her lactation length for previous lactation
3) Evaluate body conformation/hip structure
4) Evaluate teats of dam
    - Teat placement/position on the udder
    - Teat size/diameter
    - Teat length
    - Teat orifice

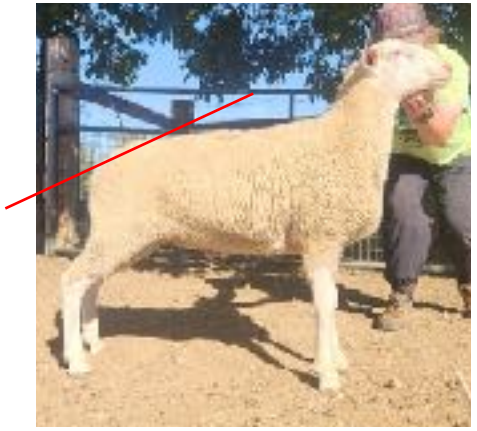


Why does hip structure matter?

- Good= Square/open hip
  - More udder above the hock
  - Easier lambing/larger birth canal
  - Hind legs should be wider than hips
- Bad = Sloping hip/low tail set
  Narrow hind legs
  - Udder will be pushed forward
  - Related to poor rear udder attachments
  - Udder drops down & forward over time

Good hip conformation





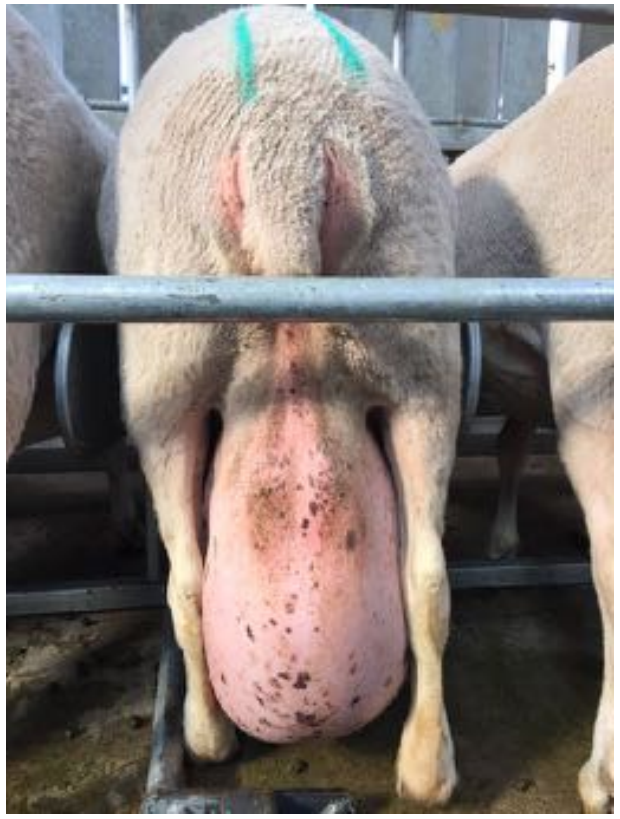
Square from behind
Flatter from the side

Poor hip conformation

Very sloped from the side
Narrow hind leg stance

Can we guess how udder conformation pertains to productive life?

Who will give more milk in their lifetime?

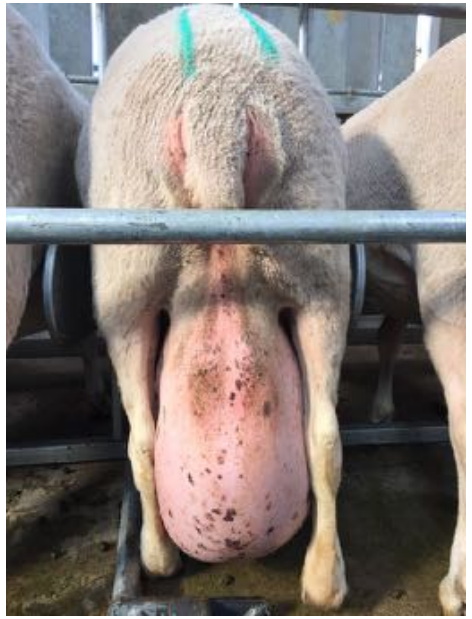


2nd lactation FRESH

7th lactation
FRESH

The Medial Suspensory Ligament:
aka Nature's Bra (Saggy Hook if you are a dairy sheep person)

- A 'sling' that attaches at the rear of the pelvis and runs down the center line and attaches to the ventral body wall towards the rear of the abdomen
- The udder halves hang on either side of the ligament
- Want a deep cleft between udder halves



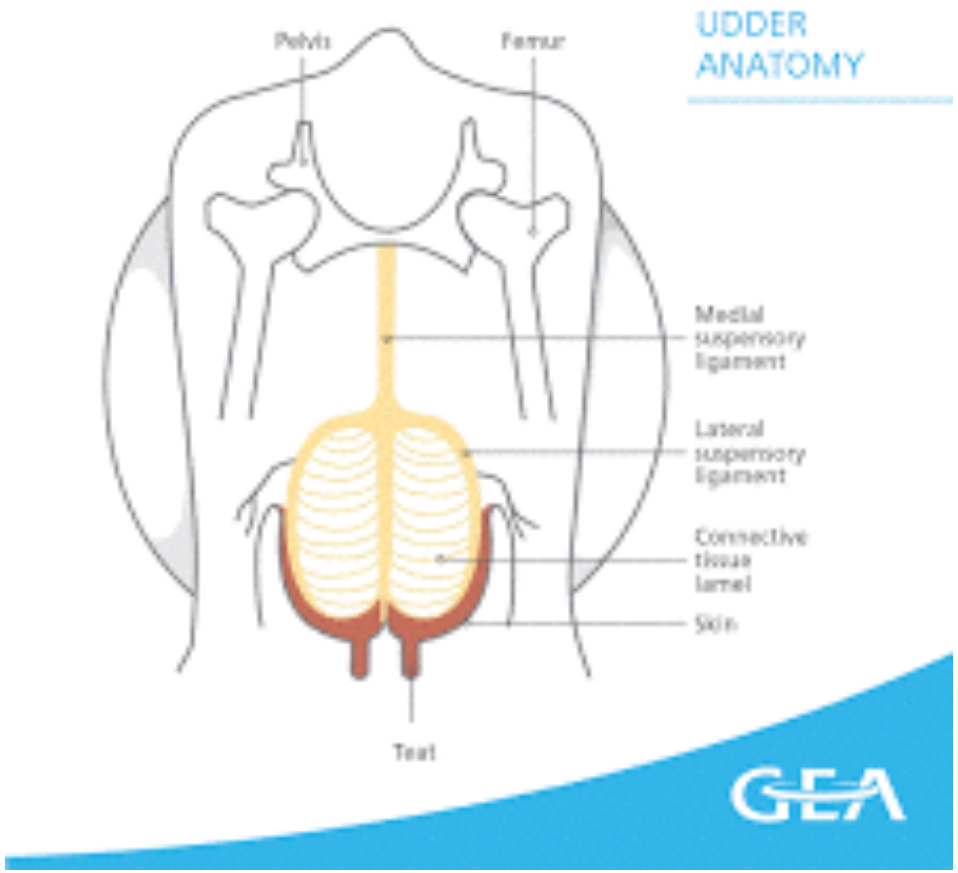
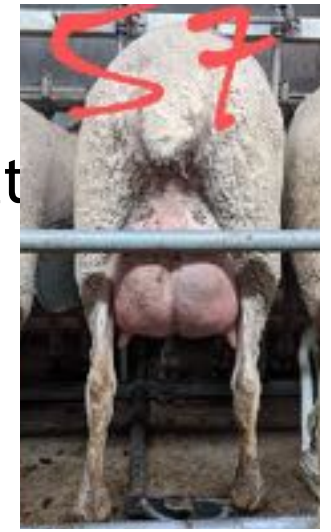


Photo courtesy of GEAFarming.co

Rear udder attachments:
Udder capacity

- Goals:
  - High,wide rear → More udder tissue above the hock
- Why does this matter?
  - We want more of the udder above the hock = Ease of milk out
    Less trauma to udder and teat
    Longer productive life



Fore udder attachments:
Udder capacity

Photo from ***The Course of Machine Milking in Small Ruminants.*** Jan Olechnowicz

- Goals:

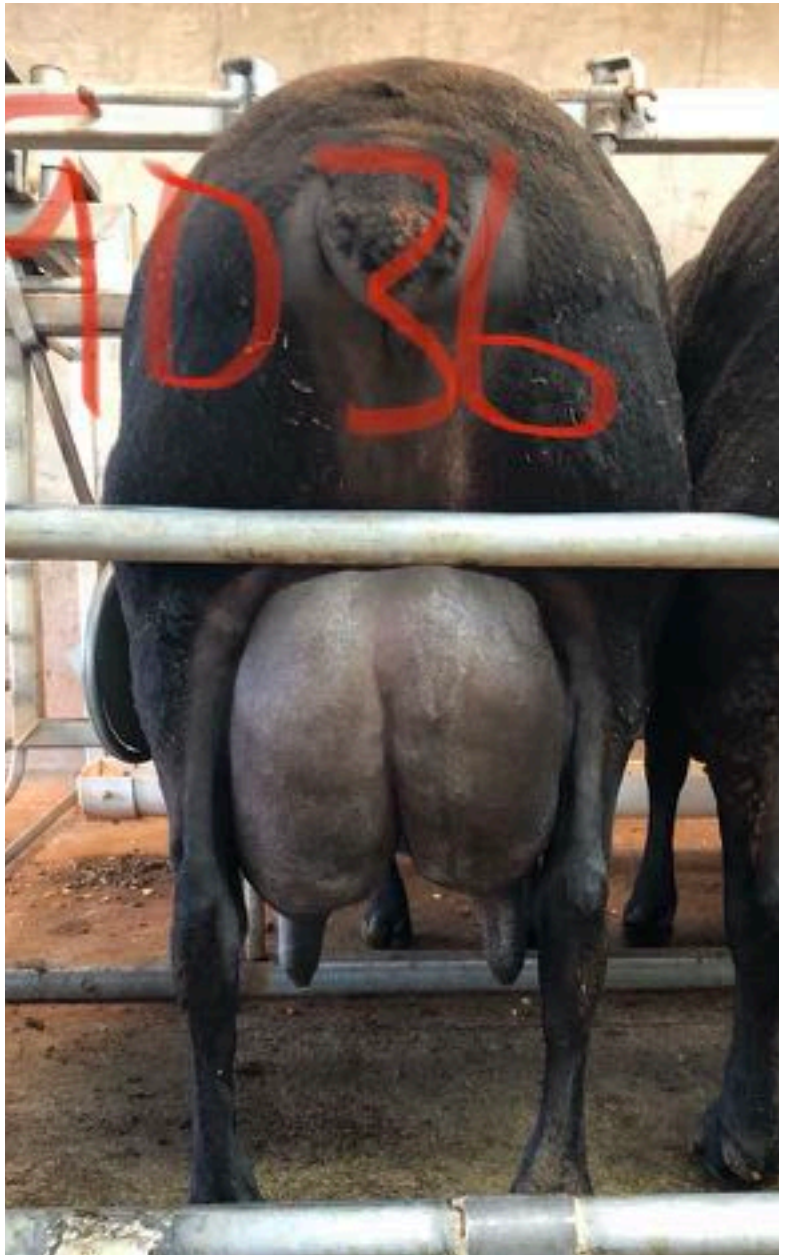
  ‘Long’ fore udder → More udder tissue above the hock

- Why does this matter?
  - We want more of the udder above the hock = more udder capacity when

    fore udder is well developed

Teat Traits

1) Teat placement/position on the udder
2) Teat size/diameter
3) Teat length
4) Teat orifice

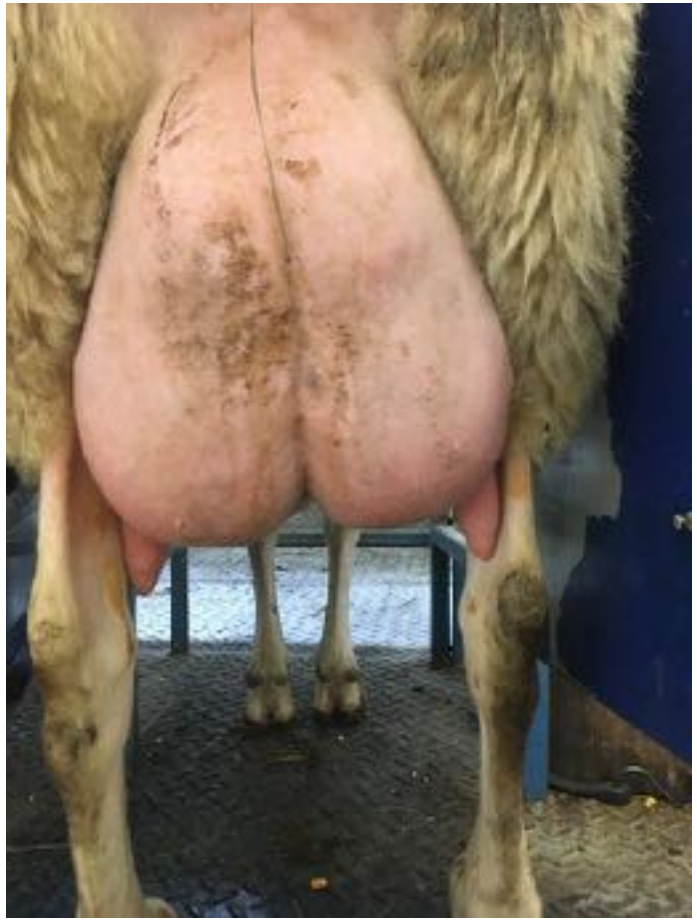


Scoring / Trait	1 p	5 p	9 p
Udder Depth			
Udder Attachment			
Teat placement			
Teat size			

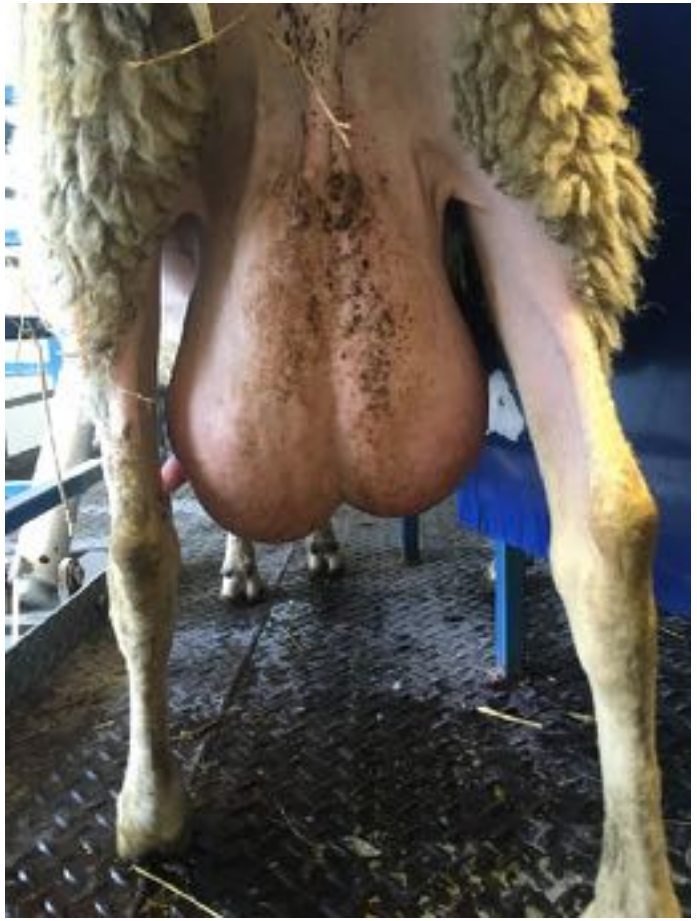
Graph from Eurosheep.com

Let’s put all of this into practice…

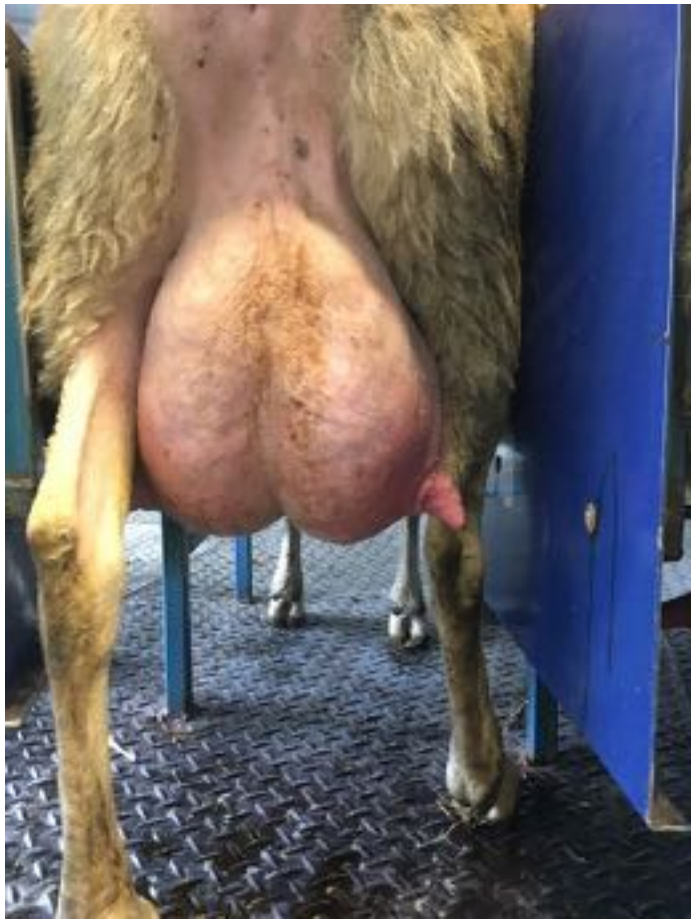
1) Decide if you like or dislike the ‘look’ of an udder
2) Describe why based on the following criteria
    1) Udder attachments (rear and fore)
    2) Udder capacity
    3) Teat traits
        1) Length
        2) Position
        3) Shape



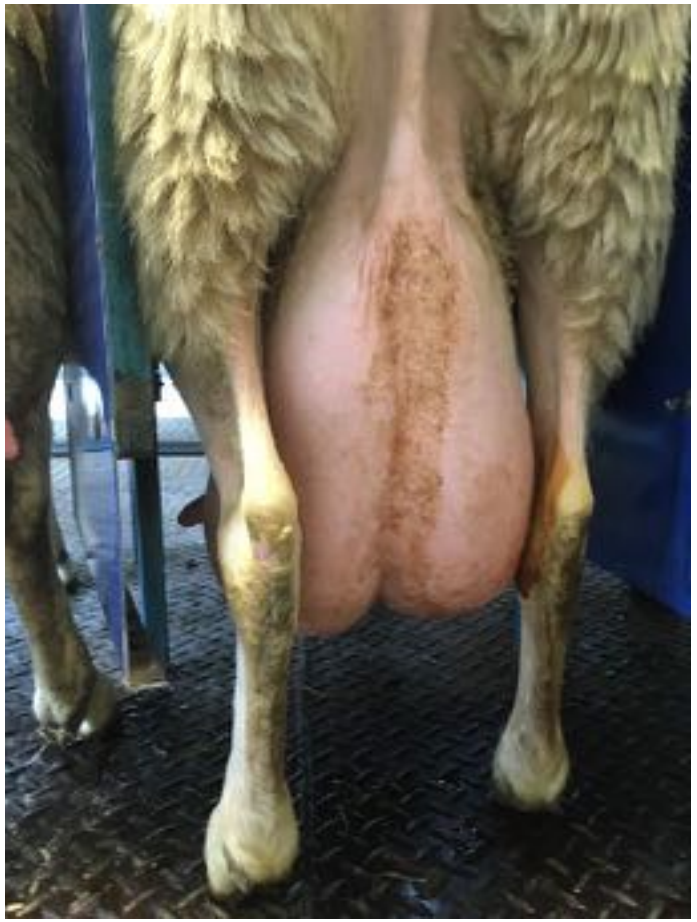
1) High, wide rear attachment
2) Good median suspensory
3) Teats- bottom, medium length, wide base



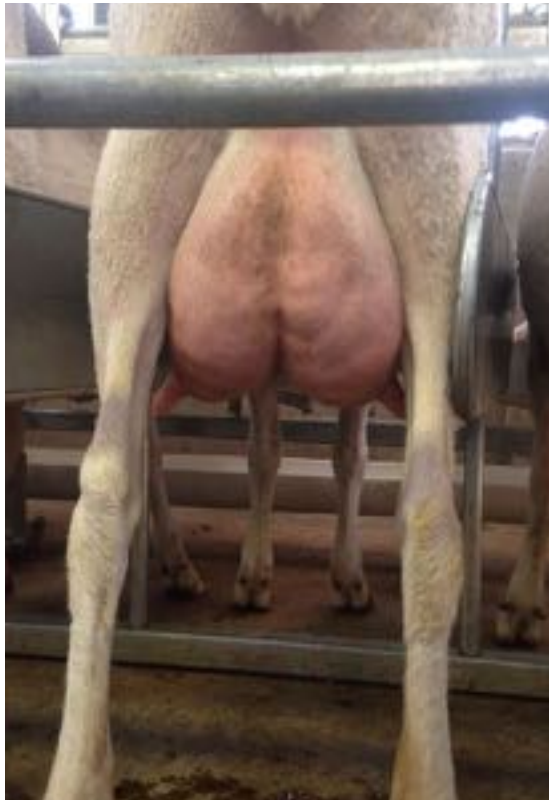
1) Narrow/weak rear attachment
2) OK median suspensory
3) Teats-side, medium length, narrow base



1) Wide but low rear attachment
2) OK median suspensory (udder above hock)
3) Teats- side, medium/short, moderate width
4) Poor fore udder attachment-leg pushes udder back



1) Narrow, low, poor rear attachment
2) Poor median suspensory (udder below hock
3) Teats- forward, narrow



Can you predict which yearling will have a greater lifetime yield?

How are these different and similar?

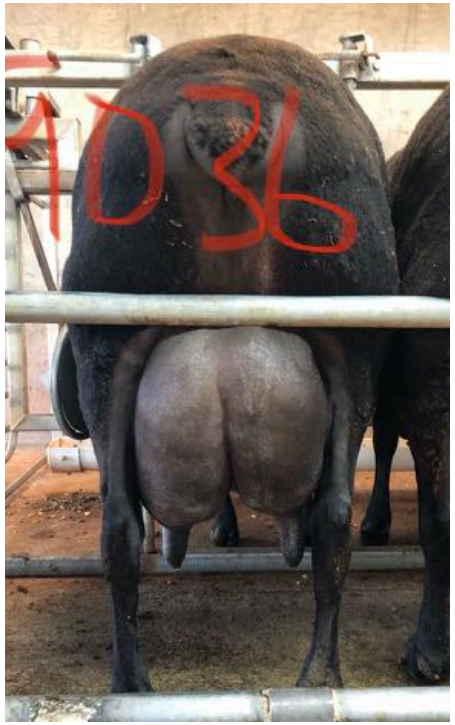
Different:

1) Higher rear udder attachment (left)
2) Stronger median suspensory/deeper cleft (left)
3) Longer teats (left)
4) More udder capacity (left)

Similar:

1) Teat placement
2) Udder above the hock

What is IDEAL?
A combination of these two ewes!



Excellent teat placement
Large udder capacity above the hock
Strong median suspensory
Square hip

High, wide rear udder attachment
Strong median suspensory-udder high above hoc

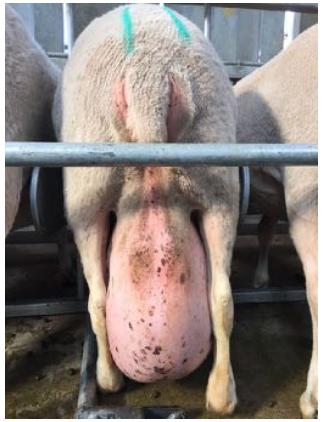
Udder texture

- Goal:
  - Udder milks down to ‘skin’
  - Fibrous tissue or fat displace udder tissu → Large udder with low milk

  - Evaluate ewes with full udder and after milk out
  - Avoid over-conditioned ewe lambs at and after puberty

  *Subclinical mastitis/OPP negatively contribute to udder texture



What about this??

What is the point of all this ‘ewe talk’?

1) You need to see the dam and relatives of any ram you select for your breeding program
2) You need to prioritize which traits you want to improve first
3) Select rams based on those traits

Genetics Statistics and Relationships of Teat and Udder Traits, Somatic Cell Counts, and Milk Production

A. J. SEYKORA2 and B. T. McDANIEL
Department of Animal Science North Carolina State University Raleigh27695-7621
Journal of Dairy Science Vol. 69, No. 9, 1986

- Heritabilities in first lactation (cattle) were:
- .63 for front teat length
- .44 for teat diameter
- .56 for rear udder clearance
- .10 for **cleft depth**
- .32 for mature equivalent milk
- .18 for somatic cell counts
- Heritabilities of distances between teats ranged from .33 to .48.

Ewe udder and teat traits as potential selection criteria for improvement of Merino lamb survival and growth

Small Ruminant Research, *Volume 225*, *August 2023, 107019*

E.G. Smith [a] [b], B.C. Hine [a], G.A. Acton [a], A.M. Bell [a], E.K. Doyle [b], J. L. Smith [a]

Table 1. Additive genetic variance (V_a), phenotypic variance (V_p), and heritability (h^2) with s.e. in parentheses, for measured and visually scored udder and teat traits. ULEN = udder length; UWID = udder width; UDEPTH = udder depth; UCLEFT = udder cleft; UATTACH = udder attachment; TLEN = teat length; TWID = teat width; TPLACE = teat placement; TSHAPE = teat shape; LESIONS = teat lesions; CCOV = crutch cover.

Trait	V_a	V_p	h^2
ULEN	2.07 (0.63)	5.91 (0.28)	0.35 (0.10)
UWID	3.37 (1.05)	10.63 (0.49)	0.32 (0.09)
UDEPTH	0.03 (0.01)	0.20 (0.01)	0.17 (0.07)
UCLEFT	0.01 (0.01)	0.54 (0.02)	0.02 (0.03)
UATTACH	0.04 (0.02)	0.31 (0.01)	0.11 (0.05)
TLEN	16.69 (3.59)	29.54 (1.51)	0.56 (0.10)
TWID	7.33 (1.81)	16.75 (0.81)	0.44 (0.10)
TPLACE	0.01 (0.01)	0.17 (0.01)	0.09 (0.05)
TSHAPE	0.03 (0.01)	0.18 (0.10)	0.16 (0.06)
LESIONS	0.00 (0.00)	0.05 (0.00)	Inestimable
CCOV	0.14 (0.04)	0.35 (0.02)	0.41 (0.10)

Genetic Parameters of Udder Traits, Somatic Cell Score, and Milk Yield in Latxa Sheep

Journal of Dairy Science Vol. 88, No. 6, 2005

"Milk yield was estimated to have a genetic correlation of 0.43 with udder depth, 0.10 with udder attachment, –0.25 with teat placement, and –0.10 with teat size, which were unfavorable in general. "

Interpretation:

Udder size and udder attachment correlate *positively* to milk yield

Teat placement and teat size correlate *negatively* to milk yield

Table 2. Genetic parameters (heritabilities and genetic correlations ± SE of traits in first and later lactations.
the estimates) of udder type

	h2, First lactation	h2, Later lactations	Genetic correlation
Udder depth	0.27 ± 0.04	0.24 ± 0.02	0.91 ± 0.05
Udder attachment	0.22 ± 0.03	0.25 ± 0.02	0.85 ± 0.08
Teat placement	0.38 ± 0.03	0.42 ± 0.03	0.93 ± 0.03
Teat size	0.39 ± 0.04	0.39 ± 0.03	0.95 ± 0.3

High heritability > 0.40; Low <0.15

How do you consider udder conformation in selecting sires?

1) Evaluate udder of dam
2) Evaluate age of the dam
    1) What can you say about her productive life?
3) Evaluate body conformation/hip structure
4) Evaluate teats of dam
    - Teat placement/position on the udder
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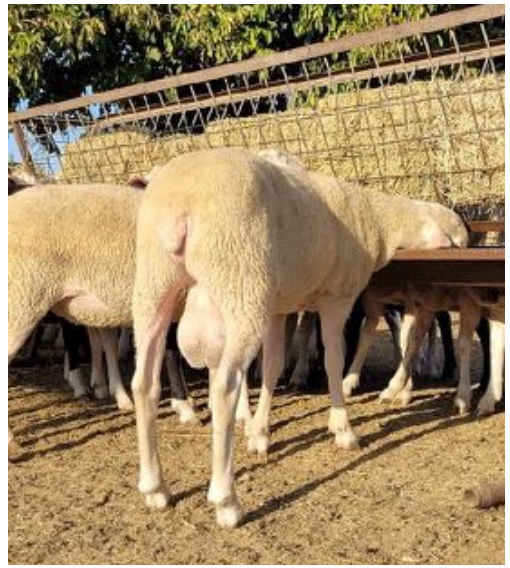
    - Teat length
    - Teat orifice



This sire is advertised by:

Dam

Full Sister

Ram #1

1) Strong topline
2) Deep chest floor
3) Long body
4) Wide rear leg stance
5) Square hip
6) Upright pasterns

180 DIM

Ram #2

1) Strong topline
2) Short/square body
3) Deep chest floor
4) Open rib
5) Upright pasterns/slightly long
6) Wide rear leg stance

180 DIM

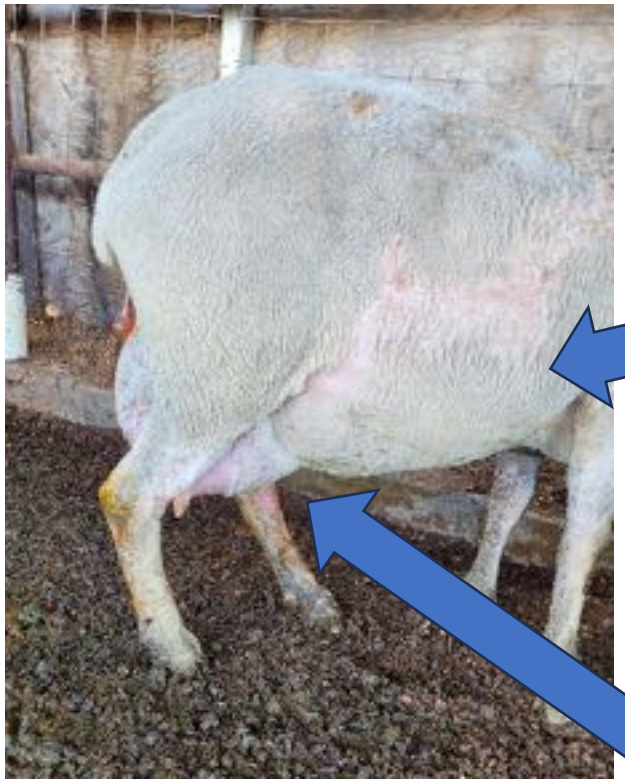
Ram #3

1) Strong topline
2) Tall
3) Very long body
4) Long hip*
5) Square hip
6) Upright pastern

‘Length of hip’

**This ram is thin/strong rut
**Need context when evaluating rams-see Dam in next slide

Dam of Ram #3



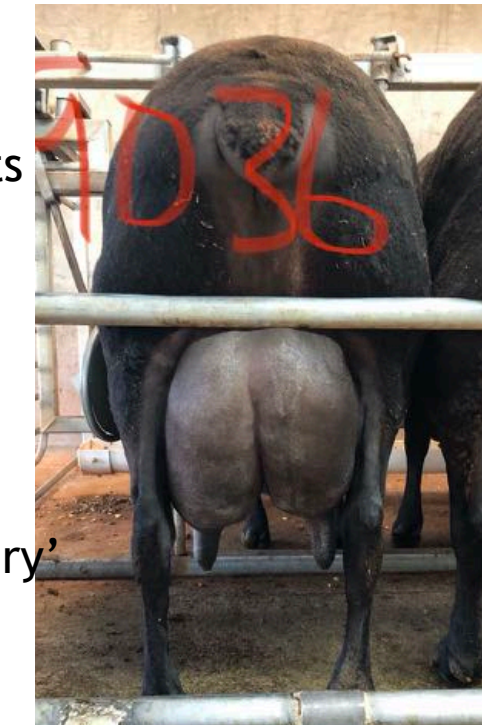
Open rib/deep chest floor

Fore udder attachment

These rams are following the sons of these ewes:

Good udder/teat traits
Large udder capacity
Oversize frame

Goals:
Retain udder traits
Shrink frame size
Make lambs more ‘dairy’



Good udder traits
Family has high productive life
OK teat traits
Smaller frame, very dairy

Goals:
Retain udder attachments
Retain long productive life

Improve teats, lengthen fore udder

Bringing it all together…

1) Evaluate closest female relatives to determine sire selection
2) Determine which traits have priority in type selection
3) Avoid ‘deep udders’- below the hock- when selecting for genetic improvement
4) Evaluate ewes at freshening to best evaluate udder characteristics
5) Re-evaluate ewes late in lactation to determine changes to udder quality, teat placement, etc.

The point of all of this…

Genetic selection for conformation and milk production are equally important.

You milk a flock of sheep.

Your best ewe has little impact on the milk tank volume compared to the ‘average’ of all the ewes combined.

Any Questions?

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