Assessment of Small Ruminant genetic diversity: Selection approaches, gene bank use, and areas of needed progress

Dan Waldron

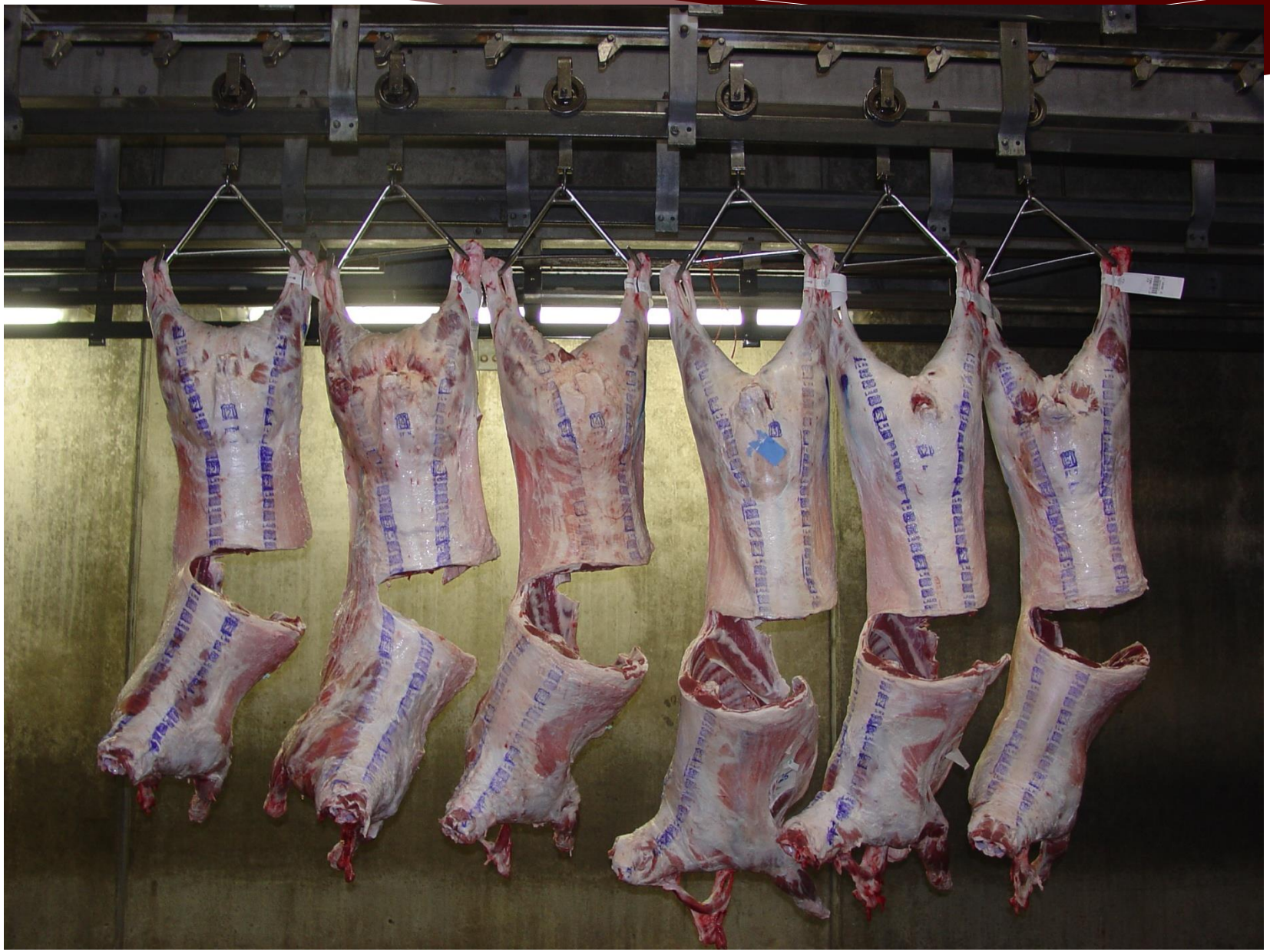
Texas A&M AgriLife Research

Genetic Selection

method of choosing the parents of the next generation to change a population of livestock

Desirable change:

increased, sustainable, production



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Genetic Selection

method of choosing the parents of the next generation to change a population of livestock

Desirable changes:

increased, sustainable, production
improved reproduction
more meat, less fat
more efficient production
adapted to the environment
resistance to disease
greater impact on undesirable plants

Genetic Selection

- Breeds developed to fit environments (economic and physical)
- Environments change over time

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Top ten breeds by number of registrations

	2000		2010		2013
1	Suffolk	1	Suffolk	1	Katahdin
2	Dorset	2	Hampshire	2	Hampshire
3	Hampshire	3	Dorset	3	Suffolk
4	Southdown	4	Southdown	4	Dorper
5	Rambouillet	5	Dorper	5	Dorset
6	Katahdin	6	Katahdin	6	Southdown
7	Columbia	7	Rambouillet	7	Shropshire
8	Montadale	8	Shropshire	8	Shetland
9	Dorper	9	Shetland	9	Rambouillet
10	Shropshire	10	Montadale	10	Polypay
	Top 10				
	67030		46910		48772

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From 2000 to 2013

Texas Breeding sheep	62%
ARSBA registrations	38%
PMCI Wool volume	40%

From 2000 to 2013

Texas Breeding sheep	62%
ARSBA registrations	38%
PMCI Wool volume	40%
Hair sheep registrations	208%

Selection practices

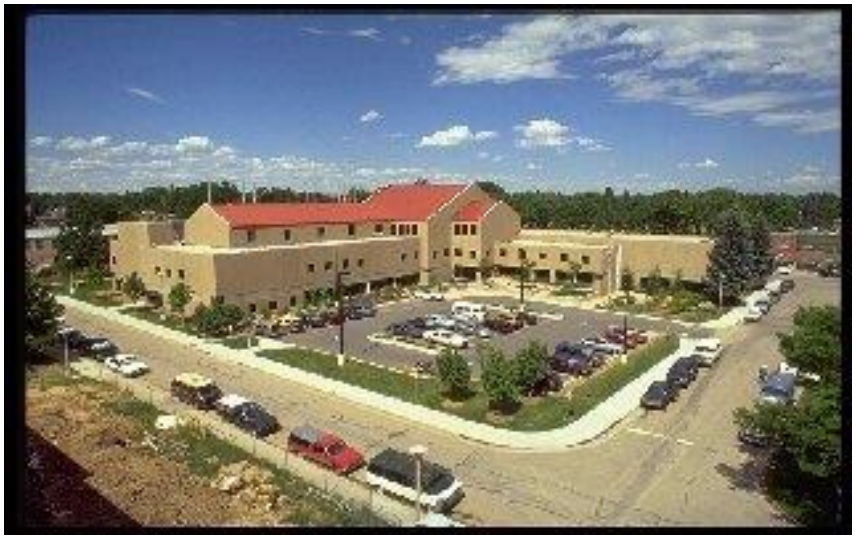
- Central Performance Testing

Selection practices

- Central Performance Testing
- NSIP – Targhee, Suffolk, Polypay, Katahdin
- BGIN
- Genomic breeding values

Assess – Protect – Preserve
NCGRP - NAGP

- Animal program initiated in 1999
- Secure reserves of germplasm/tissue for industry and research use
- Provide a wide range of users with information on breed populations and performance



Sheep breeds preserved in NAGP

Barbados Blackbelly
Bluefaced Leicester
Composite
Dorset
Gulf Coast Native
Hog Island
Jacob
Katahdin
Lincoln
Polypay
Romanov
Santa Cruz Island
St. Croix
Targhee
Wensleydale
Black Welsh Mountain
Columbia
Dorper
Finnsheep
Hampshire
Icelandic
Karakul
Leicester Longwool
Navajo Churro
Rambouillet
Romney
Shetland
Suffolk
Texel

Total : 47000+ units of semen from 741 rams

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Goat breeds preserved in NAGP

Alpine
Angora
Boer
Kiko
LaMancha
Myotonic
Nigerian Dwarf
Nubian
Oberhasli
Saanen
San Clemente
Spanish
Toggenburg

Total : 8900+ units of semen from 295 bucks

Current needs

- Comprehensive phenotype recording
- Difficult traits

Ewe Stayability

Survival from:	N	Dorper	Rambouillet	P
1st mating to 2nd	196	93 %	95 %	
1st mating to 3rd	196	85 %	88 %	
1st mating to 4th	196	76%	80 %	
1st mating to 5th	196	64 %	71 %	
1st mating to 6th	196	52 %	64 %	.09
1st mating to 7th	196	33 %	51 %	.01
1st mating to 8th	196	26 %	32 %	.36

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Early-Season Breeding in Meat Goats

- *Selected for breeding based on* breeding value for early breeding season fertility

- Knowledge of relationships between early breeding season fertility and other economically important traits will lead to increased efficiency of production

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Super Juniper Eating Goat

- Selective Breeding
  - Expected Progeny Difference
  - High and Low lines
- Genomic Differences
- Rumen microbial differences
- Pharmacokinetic differences in monoterpene metabolism

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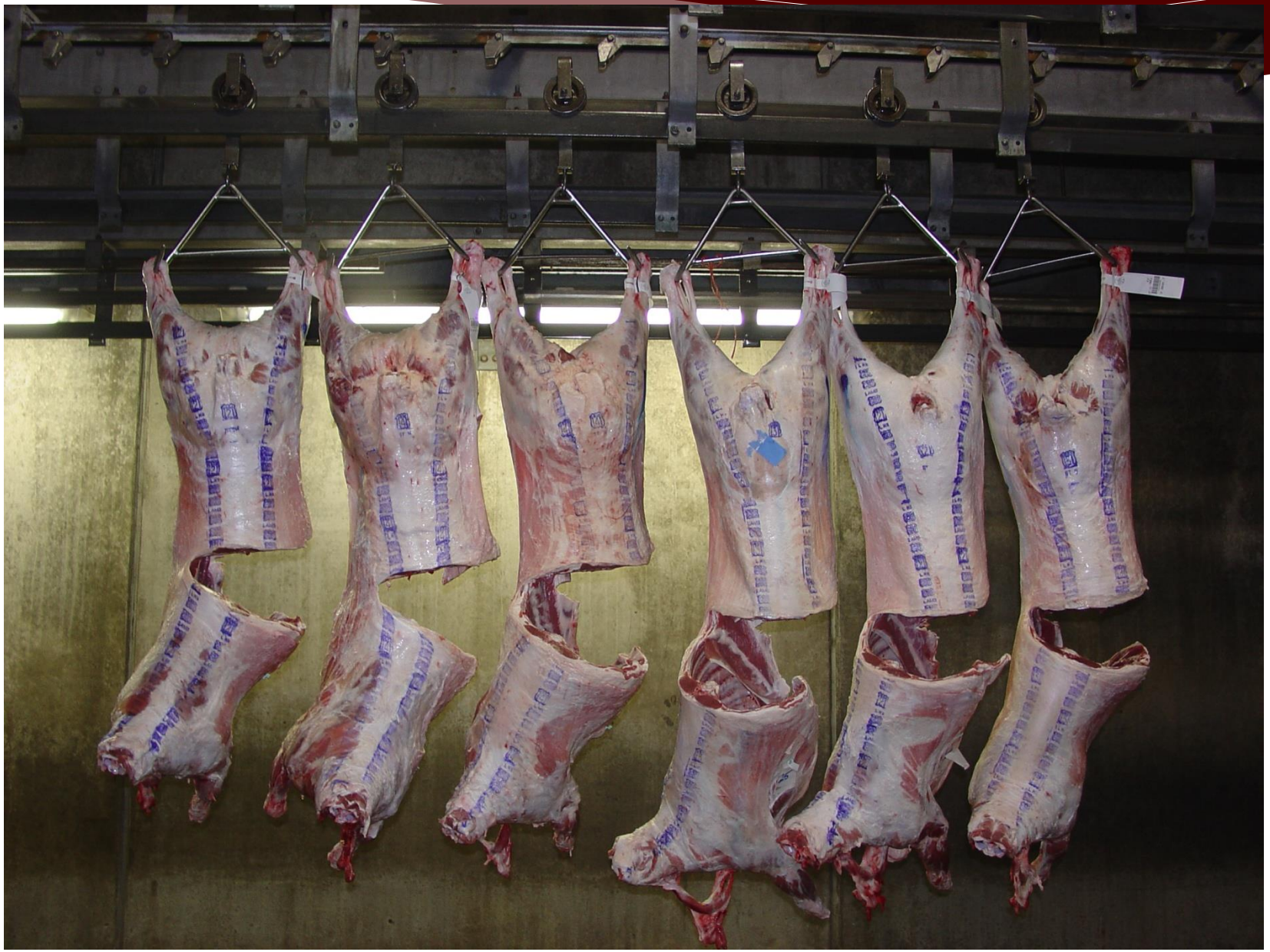

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Know well the condition of your flocks,
and pay attention to your herds;

For riches are not forever,

Nor does a crown endure to all generations.

Proverbs 27:23-24