

Use of breed resources to generate more lambs in commercial operations.



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Charles Parker and the Holy Grail

"Pounds of quality lamb marketed per
ewe per year"



Characteristics of a profitable commercial ewe flock.

Sheep do not require individual attention/labor.

Ewes are healthy and long lived.

Ewes give birth to multiples unassisted.

Ewe and lambs bond strongly at lambing.

Lambs survive and thrive with no/little intervention.

Genetic effects used in crossbreeding

Differences among breeds.

Lamb and ewe heterosis effects.

Complementarity.

Reproductive traits of 1/2 Finnsheep and domestic ewes

Trait	1/2 Finnsheep	Domestic
Percentage lambing, young	85	55
Percentage lambing, old	86	80
Number born	1.92	1.40
Number weaned	1.53	1.11
Litter weaning wt per ewe mated	58.5	44.7
Fleece weight	6.6	7.5

Growth and carcass traits of 1/4 Finnsheep and domestic lambs

Trait	1/4 Finnsheep	Domestic
Birth weight	8.4	9.5
Survival	77	80
Weaning weight	42.2	44.2
Daily gain	0.51	0.53
Fat depth	0.20	0.20
Rib eye area	1.95	2.06

Summary of Finnsheep relative to domestic breeds

Greater percentage lambing, especially ewe lambs.

Greater number born and similar lamb survival.

Greater litter weaning weight per ewe mated.

Lighter birth and weaning weights.

Similar postweaning growth.

Similar fat depth but smaller rib eye area.

Reproductive traits of 1/2 Finnsheep and 1/2 Romanov ewes during fall and spring breeding

Trait	1/2 Finnsheep	1/2 Romanov
Fall breeding		
Percentage lambing	83	89
Number born	2.05	2.20
Number weaned	1.75	1.92
Litter weaning wt per ewe lambing	62	69
Spring breeding		
Percentage lambing	82	91
Number born	1.98	2.09
Number weaned	1.57	1.71
Litter weaning wt per ewe lambing	52	60

Summary of Romanov relative to Finnsheep

Greater percentage lambing, especially in fall lambing.

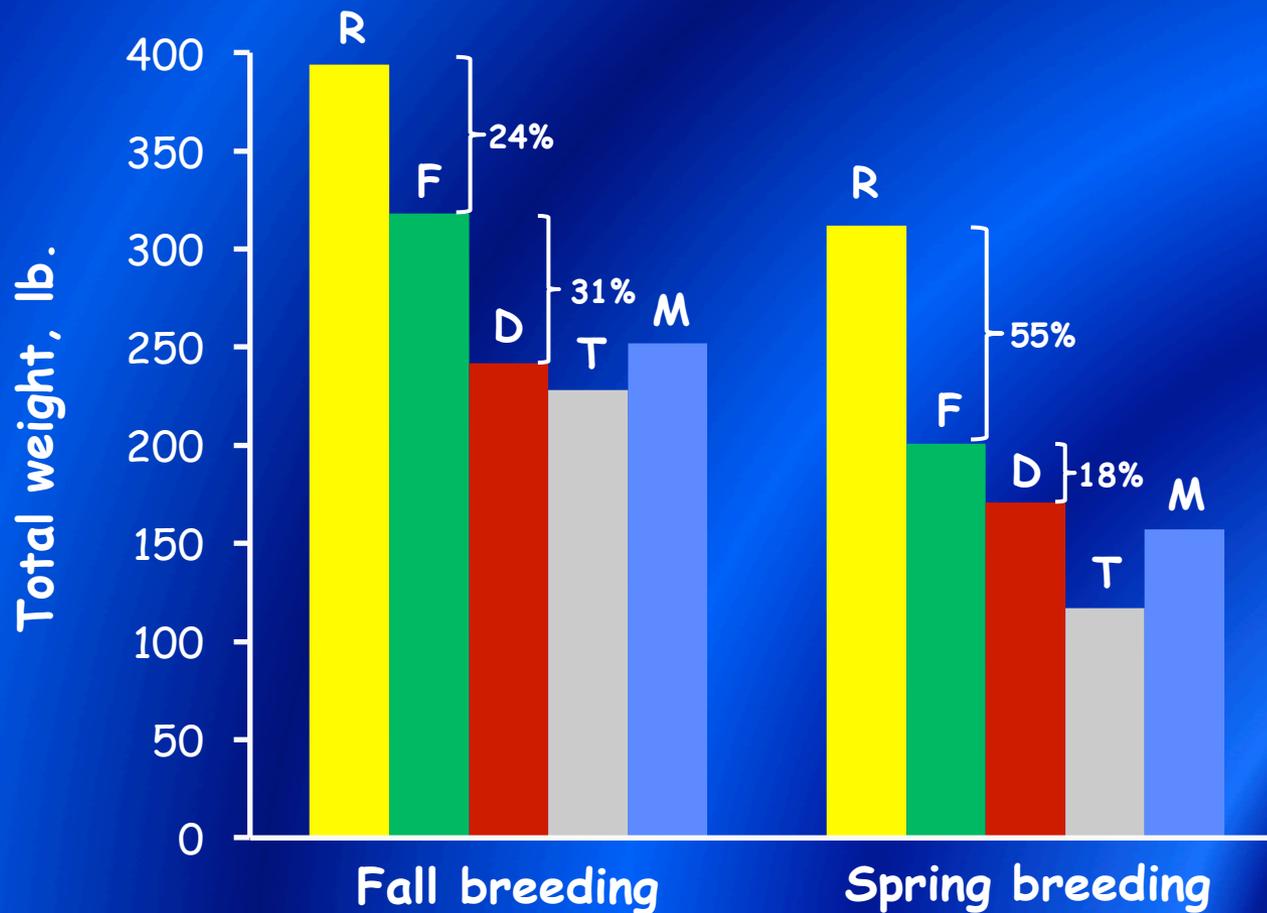
Greater number born and similar lamb survival.

Greater litter weaning weight per ewe mated.

Similar for growth and carcass traits.

Lower quality fleeces.

Total weight of lambs produced by crossbred ewes from 1 to 3 years of age (fall breeding, phase 1) and from 4 to 6 years of age (spring breeding, phase 2).



Four key breeds for profitability of commercial ewe flocks.



Romanov



Finnsheep



Polypay



Katahdin

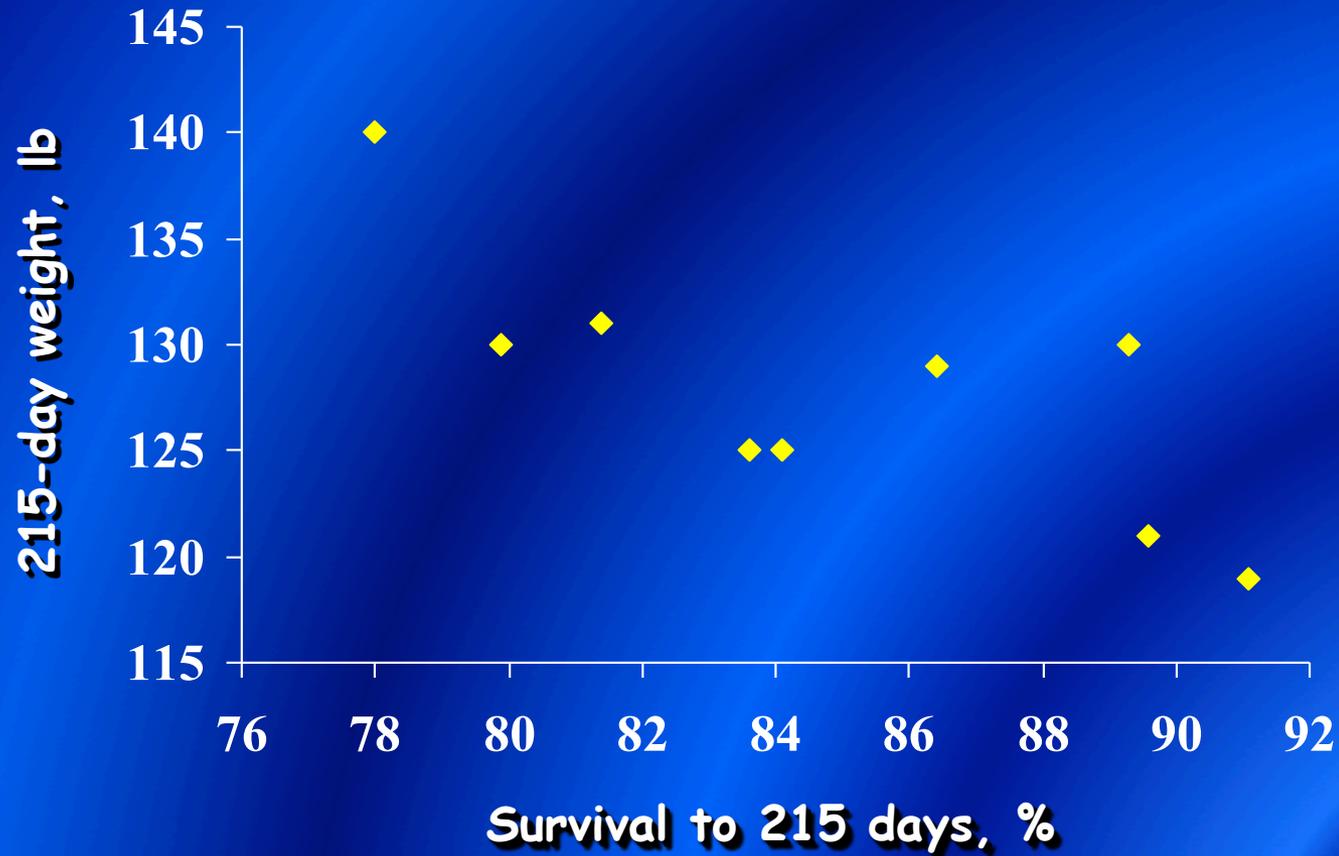
What are the impacts of terminal sire breeds?

Terminal sire breeds affect growth and carcass traits of progeny.

What about lamb survival?

Is there an inherent biological antagonism between
growth and survival?

Effects of sire breed on growth and survival of crossbred lambs.



Number of lambs produced by Romanov crossbred ewes when multi-sire mated to Suffolk or Texel rams.

	Suffolk	Texel
High input		
Born	957	1,028
Weaned	746	829
Low input		
Born	1,075	1,111
Weaned	787	855

Ewes mated to Texel rams weaned 83 (11%) and 68 (9%) more lambs than ewes exposed to Suffolk rams in the high- and low-input systems, respectively.

My thoughts

There is an inherent biological antagonism between growth and survival.

If lamb survival is high, for whatever reasons, then terminal sire breeds won't affect survival because genetic differences are masked.

However, as lambs become increasingly stressed, the antagonism between growth and survival is expressed and terminal sire breeds affect lamb survival.

Conclusions about breed effects on flock productivity.

Breeds differ greatly for ewe reproductive traits.

Romanov and Finnsheep crossbred ewes are far more productive than traditional breeds.

Romanov crossbred ewes have excelled for fertility rates during spring breeding.

Ram breeds can impact the number of lambs marketed as well as growth and carcass traits.

Use breeds appropriate for sire and dam roles.

Definition of heterosis

Average performance of crossbred sheep relative to the average performance of purebred sheep.

Genetic type	Weaning wt.	Purebred average	Heterosis
Rambouillet	72	75	
Dorset	78		
Crossbred	79		$79 - 75 = 4$ (5%)

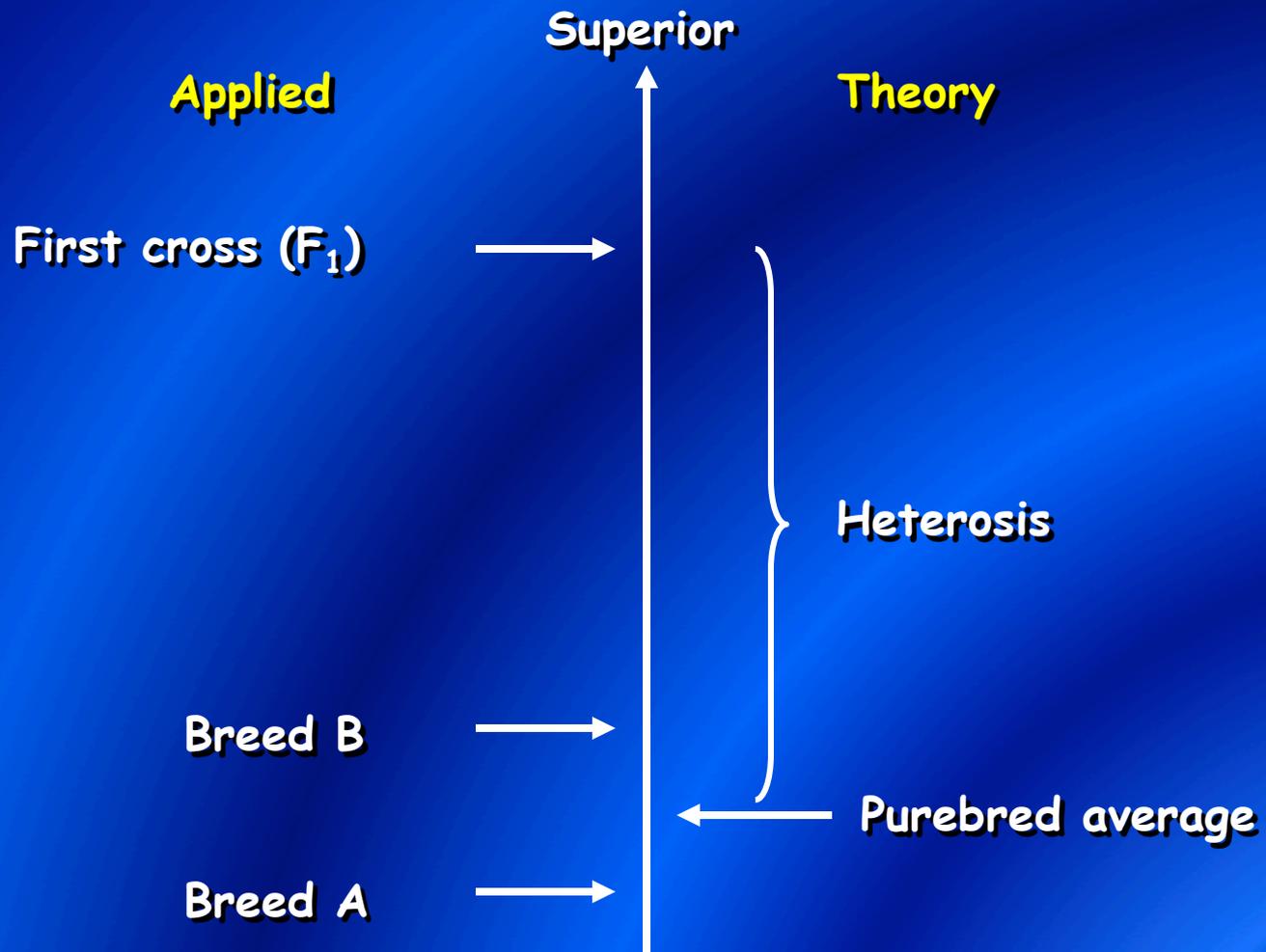
Performances of crossbred lambs, ewes and rams are influenced by heterosis effects.

Lamb and ewe heterosis effects (%)

Trait	Lamb	Ewe
Percentage lambing	2.6	8.7
Number born	2.8	3.2
Lamb survival	9.8	2.7
Weaning weight	5.0	6.3
Weight of lambs weaned per ewe exposed	17.8	18.0

Levels of heterosis for various genetic types.

Genetic type	Percentage
Purebred	0
First cross	100
2-breed rotation	67
3-breed rotation	86
4-breed rotation	93
2-breed composite	50
3-breed composite	62
4-breed composite	75



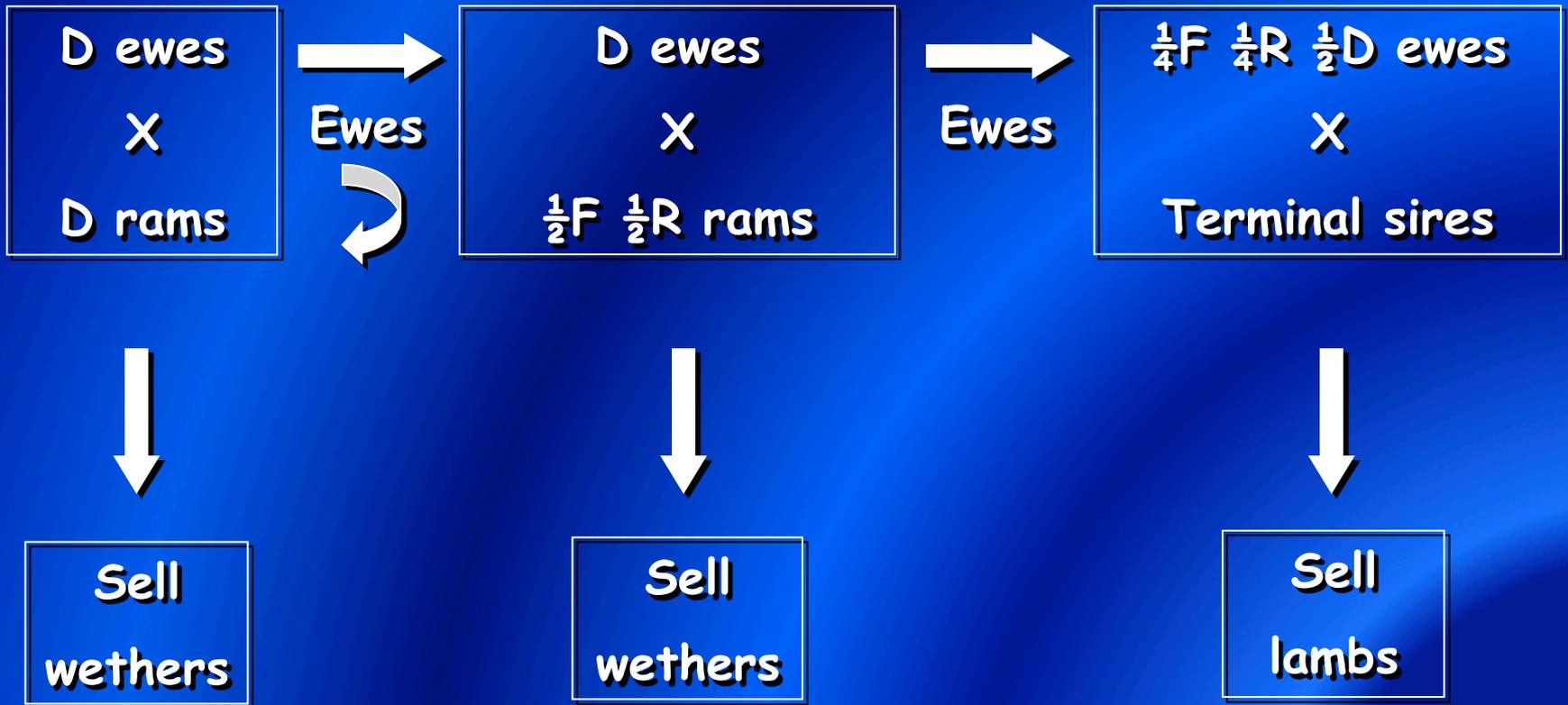
Performance of purebred and first-cross sheep.

Complementarity

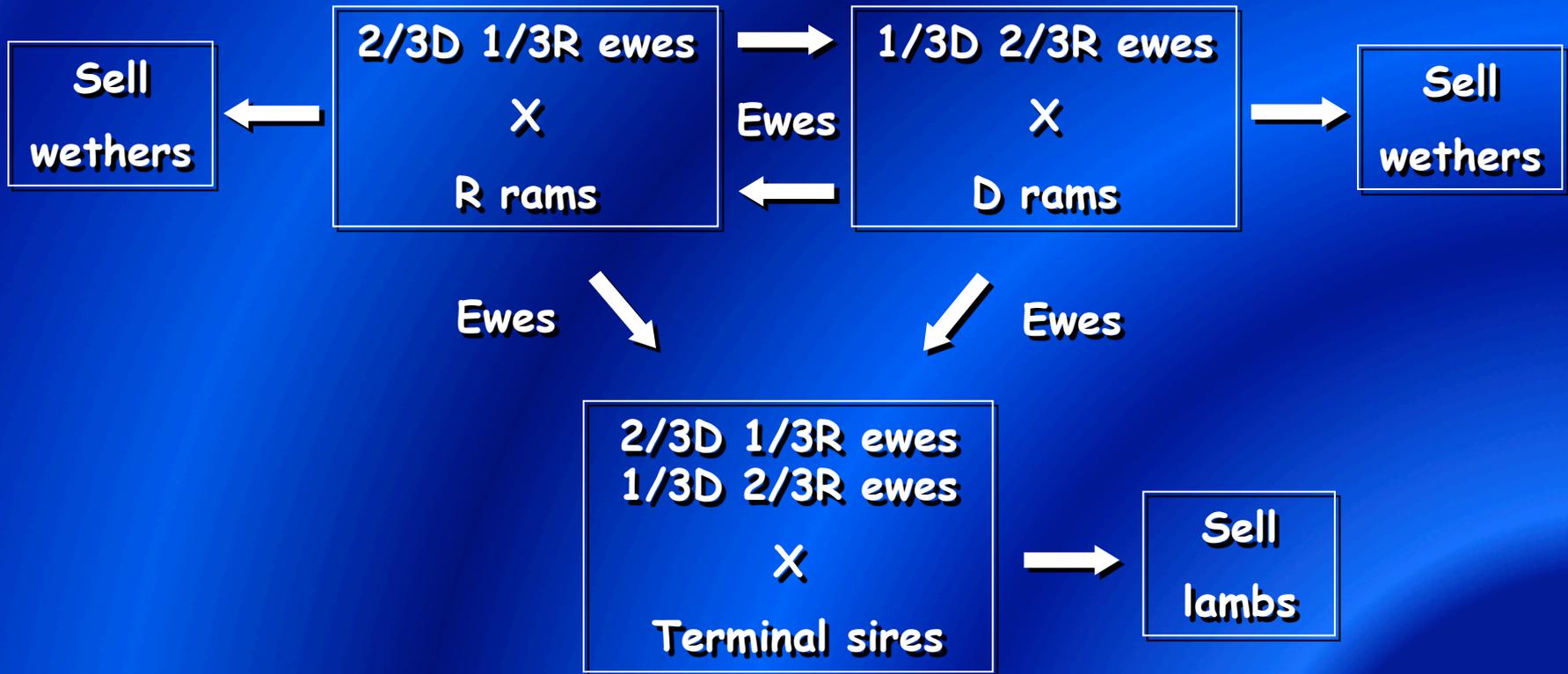
Ewes and rams do not equally influence performance of lambs because lambs are produced, reared, and nurtured by ewes.

Takes advantage of the strong points of breeds and reduces less desirable qualities.

First-cross terminal system



Two-breed rotational, terminal system



Definition of a composite breed

A new breed formed by crossing two or more breeds, then selecting within the new crossbred population.

Polypay



Katahdin

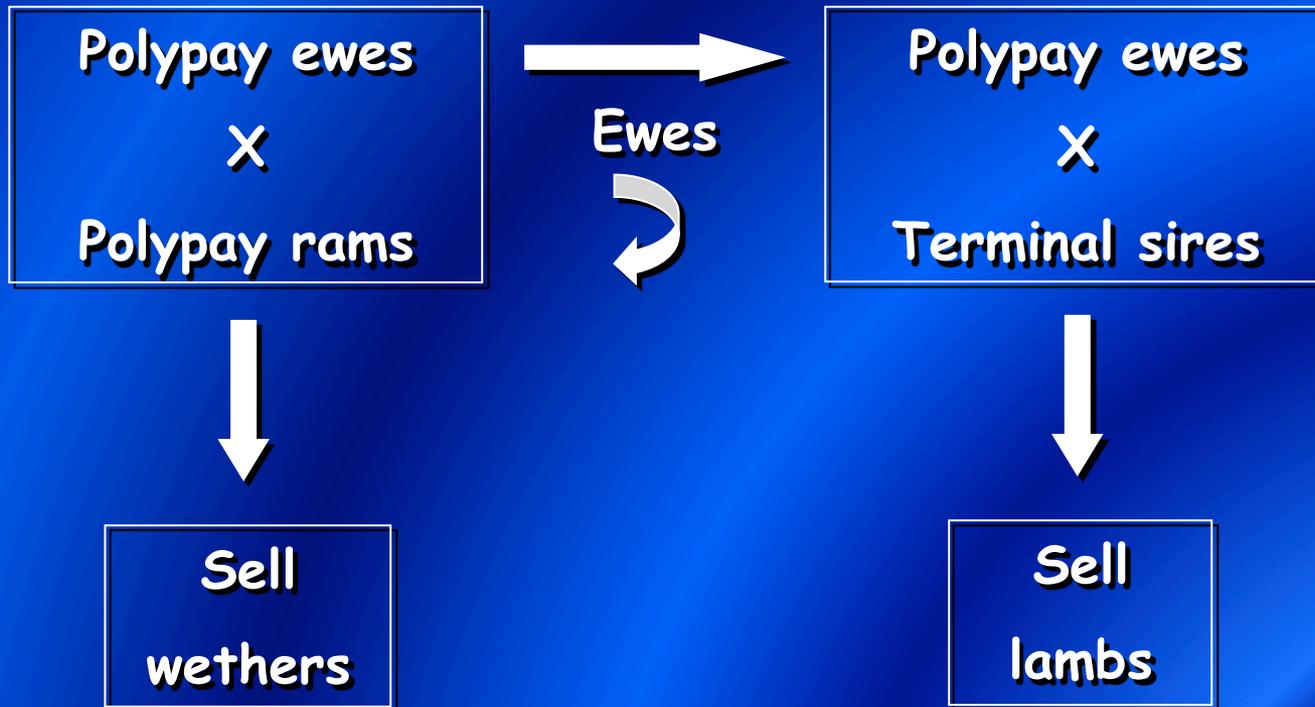


Appeal of composite breeds

Simple and practical breeding system
to use breed and heterosis effects.



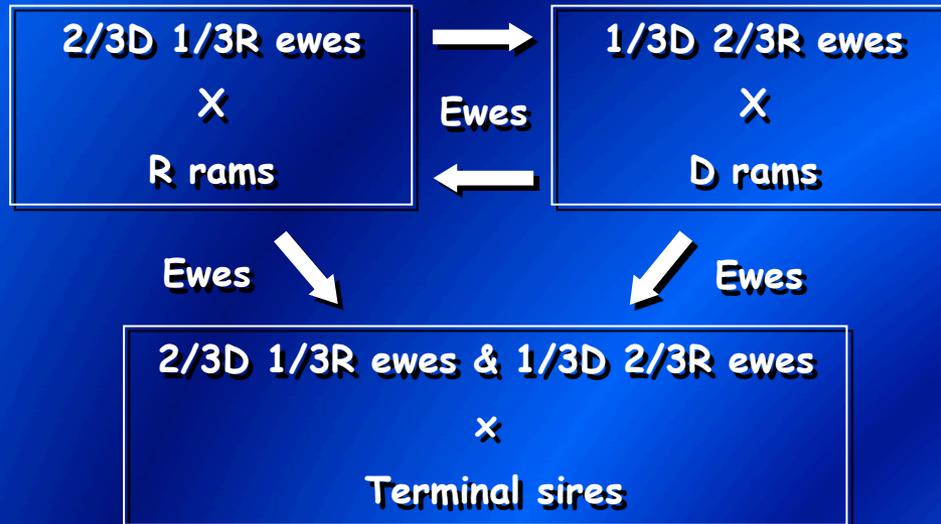
Composite terminal system



First cross



Two-breed rotational



Composite



Attributes of terminal mating systems

Attributes	First cross	2-breed rotational	4-breed composite
Types of ewes	2	2	1
Ewe breed composition	Purebred & first cross	1/3, 2/3 & 2/3, 1/3	Composite
Breeding flocks/ Ram breeds	3	3	2
Relative production	150	146	150

All three systems can produce ewes that are genetically similar.

Composites: a simple and practical system to use breed and heterosis effects and an alternative to more complex crossbreeding systems.

Use the system that works for you!

Recipe for building a profitable commercial flock

Use a terminal crossbreeding system.

Exploit maternal heterosis.

Produce your own prolific crossbred ewes.

Buy maternal rams based on relevant EBVs.

Buy terminal rams based on relevant EBVs.

Questions?