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Use of Hair Breeds in Integrated Systems

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Expansion of the U.S. sheep industry depends on improvement of reproductive efficiency and reduction of labor and inputs, so that sheep production becomes more practical and profitable.

These issues relate to the concept of easy-care, low-input, forage-based production systems that are growing in popularity in the U.S. Such systems require breeds of sheep that are well adapted, healthy, and produce vigorous lambs. Hair breeds evolved under low-input, forage-based production systems.

In addition to elimination of shearing costs due to natural shedding of hair, favorable attributes of hair breeds reportedly include adaptation, parasite tolerance, fertility, seasonality, maternal behavior, and lamb vigor. Therefore, hair breeds are obvious genetic resources that merit evaluation relative to wool breeds under both intensive and extensive production systems.

Large-scale experiments to evaluate hair breeds for relevant traits are necessary to determine their appropriate use in terminal crossbreeding systems designed for specific production and marketing situations. The relative importance of traits can depend on characteristics of specific production systems. For example, in an intensive system the producer may rear some lambs artificially and provide shelter and creep feed to all lambs. In contrast, in an extensive system lambs may be naturally reared by their dams without access to creep feed. The importance of adequate milk production and maternal behavior is greater in the extensive system than in the intensive system. As a second example, length of seasonal fertility is a critical trait in spring-breeding production systems, but not very important for the common annual production system of fall breeding and spring lambing. The relative performance and, therefore, the merit of breeds may differ in intensive and extensive production systems.

Choosing appropriate breeds that perform well in a specific production system is a key issue. First, one should consider various resources that affect production efficiency, such as the value of land, feed costs, labor availability, facilities, managerial skills, etc. Understanding these resources helps to define a suitable production system. Next, traits that most impact efficiency in the identified system should be determined and target levels of performance established for each important trait. This process provides a blueprint to describe ideal rams, ewes, and lambs for the specific production system and marketing goals. Finally, the blueprint guides selection of appropriate breeds based on knowledge of breed characteristics in the relevant environment and determines breed composition of crossbred sheep (ewes, lambs, and, maybe, rams).

This concept of matching wool and hair breeds to specific production systems is being tested in an experiment at MARC. The experimental objective is to evaluate production efficiency under both intensive and easy-care production systems of four types of crossbred ewes. Varying levels of reproductive efficiency and easy-care attributes were created by mating Romanov ewes to Rambouillet, Dorset,

Dorper, and Katahdin rams. Purebred and crossbred Romanov ewes excel in all aspects of reproduction and therefore make up one-half of each crossbred. In addition, the Romanov breed sheds its mixed fleece of hair and wool. Wool (Rambouillet and Dorset) and hair (Dorper and Katahdin) breeds are included for comparative purposes as the long-term value of wool is unknown. Rambouillet and Dorper provide a wool-hair comparison for breeds developed under extensive, arid conditions, while Dorset and Katahdin offer a similar contrast for breeds adapted to more favorable production conditions.

Rambouillet, Dorset, Dorper, and Katahdin rams were single-sire mated to about 360 Romanov ewes each of three years (2000, 2001, and 2002). Breed associations were contacted to request information relevant to the experiment and to seek advice on sources of rams. A total of 18 rams per breed, all by different sires, contributed to the experiment. White and Blackheaded Dorper rams were used equally. Rambouillet rams were purchased from Texas producers to capture adaptability and hardiness strengths of sheep from this arid region. One half of the Romanov ewes were exposed during October and half during December.

Table 1. Performance of One-Year-Old Crossbred Ewes in an Intensive Production System

Trait	Crossbred Type			
	Rambouillet	Dorset	Dorper	Katahdin
Number of ewes	89	96	87	108
Breeding weight, lbs.	80.5	78.8	78.1	76.8
Conception, %	90	80	87	85
Number born	1.44	1.68	1.55	1.73
Lamb survival, %	83	70	70	76
Number 24 weeks	1.18	1.18	1.08	1.29
Litter weight 24 weeks, lbs.	116	110	107	119

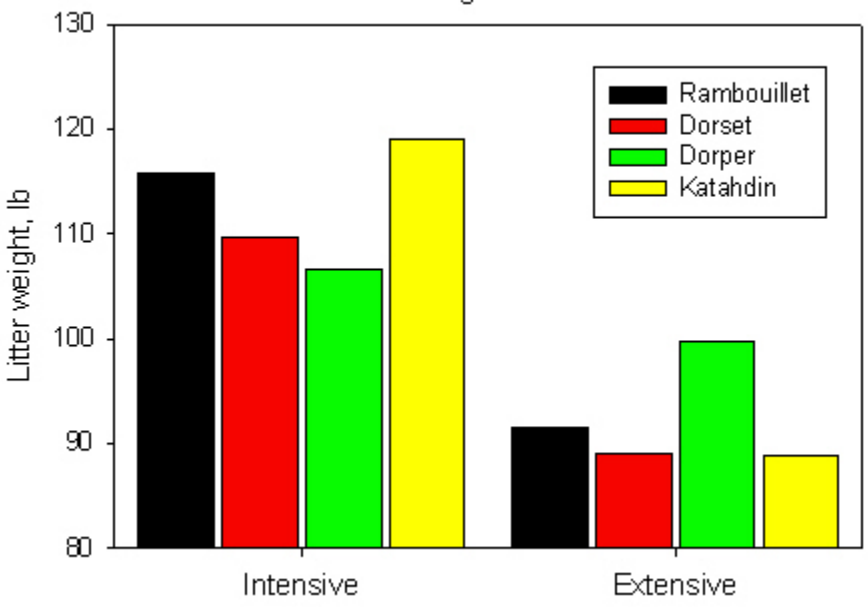
Crossbred ewes conceived in October went into an intensive production system, whereas ewes conceived in December went into an easy-care (pasture) production system. Crossbred ewes of each type are multi-sire mated to Suffolk and Texel rams to produce terminally-sired progeny and to evaluate effects of sire breed on survival and growth of market lambs. The four types of crossbred ewes are being evaluated over three parities with each ewe remaining in a single production system. In the intensive system, ewes lamb in a barn during March. If necessary, shepherds provide assistance at birth. Navels of newborn lambs are dipped in iodine and ewes and lambs are penned in a jug for about one day. Ewes are limited to rearing two lambs with additional lambs artificially reared in a nursery. Creep feed is offered by 14 days of age and lambs are weaned at eight weeks of age. In contrast, the easy-care production system uses much less labor. In this system, ewes lamb on pasture during May and ewes are completely responsible for rearing of all lambs. The only labor at lambing is the daily tagging of lambs required for research purposes. Donkeys and guard dogs are used for predator control during pasture lambing. Lambs born on the pasture are weaned at 12 weeks of age.

Table 2. Performance of One-Year-Old Crossbred Ewes in an Easy-Care Production System

Trait	Crossbred Type			
	Rambouillet	Dorset	Dorper	Katahdin
Number of ewes	105	107	113	99
Breeding weight, lbs.	83.4	84.6	113	99
Conception, %	89	89	90	89
Number born	1.46	1.53	1.57	1.82
Lamb survival, %	70	66	71	61
Number 24 weeks	1.01	1.01	1.12	1.10
Litter weight 24 weeks, lbs.	92	89	100	89

Reproductive data are complete for ewes lambing at one year of age. Preliminary results are summarized for the intensive and easy-care production systems in Tables 1 and 2, respectively. Differences among Rambouillet, Dorset, and Dorper crossbred ewes for weight at breeding were minor, while the average weight of Katahdin crossbred ewes was slightly less. Effects of crossbred type on conception rate were relatively small. In each production system, Dorset crossbred ewes gave birth to more lambs than Rambouillet crossbred ewes, whereas Katahdin were more prolific than Dorper. The ranking of crossbred types for lamb survival to 24 weeks of age depended on production system. Rambouillet and Katahdin crossbred ewes did relatively well in the intensive production system. In the easy-care production system, lambs born to Rambouillet and Dorper crossbred ewes had greater survival than lambs born to Dorset and Katahdin crossbred ewes. Litter weight at 24 weeks of age per ewe lambing was calculated to measure ewe productivity **(Tables 1 and 2)**. The ranking of crossbred types in the intensive production system was Katahdin, Rambouillet, Dorset, and Dorper **(Figure 1)**.

Figure 1



In the easy-care production system, Dorper crossbred ewes were most productive, followed by Rambouillet, and then Dorset and Katahdin. The breed with the greatest productivity in the intensive production system (Katahdin) tied for the lowest productivity in the easy-care production system. Also, Dorper crossbred ewes had the lowest productivity in the intensive production system, but the greatest productivity in the easy-care production system. These results for one-year-old ewes provide strong evidence that matching breeds to specific production systems is important. Data collection on two- and three-year-old crossbred ewes must be completed before making final recommendations on the use of these four breeds.

Conclusion

it is important to identify and use breeds that perform well in the system of interest, and to guide development of breeds through selection based on performance within that system. Developing maternal lines as easy-care sheep and exploiting high levels of ewe and lamb heterosis effects in terminal crossbreeding systems is paramount. But easy-care breeds should address traits beyond hair production and parasite tolerance. To focus purpose and clarify direction, easy-care breeds should emphasize traits that affect meat production on a systematic basis. One approach is to set breed composition of maternal lines to meet target levels of performance for lowly-heritable fitness traits and, subsequently, select to make adjustments in other relevant traits. The use of Romanov in this approach is justified based on experimental results. Use of easy-care breeds, terminal crossbreeding systems, and extensive production systems could define the meat industry of appropriate regions of the country.