Bhartiya Krishi Anusandhan Patrika, 36(2): 158-163 DOI: 10.18805/BKAP305

Selection of Breeding Rams in Breeding Programs

Mubashir Ali Rather[1], Ambreen Hamadani[2], Syed Shanaz[2], Tariq Ahmad Malik[1]

Department of Sheep Husbandry,
Shrinagar-190 002, Jammu and Kashmir, India.

Received: June 2021 Accepted: July 2021

ABSTRACT

A ram is considered half the flock due to its higher fitness (the proportionate contribution of off spring to the next generation) than ewe and selection of a breeding ram is one of the most important decision on any breeding farm for a sound breeding program, a sound and quality breeding ram with excellent confirmation and above average performance in production and reproduction traits is a prerequisite. This article discusses the various aspects of selection of a breeding ram an understanding of which is absolutely important for any sheep breeder

Key words: Breeding values, Breeding, Ram, Selection.

INTRODUCTION

The most important decision in the genetic improvement of sheep population is selection of a breeding ram. A ram is considered half the flock due to its higher fitness (the proportionate contribution of offspring to the next generation) than ewe (Falconer, 1960). The breeding ram is primary tool at disposal of a breeder for the genetic improvement of sheep population flock or population (Hassani *et al.*, 2014). Therefore, for a sound breeding program a sound and quality breeding ram with excellent confirmation and above average performance in production and reproduction traits is a prerequisite. The choice of breeding ram is also determined by present and future requirements. Genetic progress is also determined by the existence of genetic variation (heritability) in flock, accuracy and the intensity of selection (Greiner). Therefore, selecting a breeding ram requires high degree of knowledge and expertise in field of animal breeding. This paper discusses some important aspects of selecting a breeding ram.

Selection tool

Following are some of the important tools used by breeders for the production of rams of high genetic merit:

1. Unique identification system for individual animals.
2. Recording performance and pedigree of flock.
3. Collection of relevant data on breeding, feeding, reproduction, production.
4. Recording monthly body weights, date of tupping and data of birth of animal.
5. Record mortality and morbidity.

Methods of selection of breeding ram

The most common methods of ram selection are visual appraisal and performance traits. However, the most accurate and scientific method of ram selection is the estimation of EBV (estimated breeding value). Sheep breeders should possess skill to select structurally and genetically perfect breeding ram. Further, selection should begin with a look at performance records followed by visual evaluation. Visual appraisal can be a good indicator of body structure, frame, size, muscling and breed character. Correct skeletal structure is important and essential for any animal to move, feed and quench thirst. The structure can be observed at shoulder angle, pastern angle, levelness of the hips and top line from neck to dock. The shoulder angle and pastern angle should be approximately 45° and 50 to 55° degrees or slightly more, respectively. The skeletal angles in the shoulders, hips and legs are important for ease of movement. The animal is generally level across their top line and able to move freely when angles are within normal ranges.

Selection on the basis of visual traits

Visual appraisal is a selection method where the breeder judges and selects breeding ram on the bases of external appearance and correct structure. It is believed that much progress in improvement has come through this method (Awgichew, 2007). As correct structure enables the ram to move and eat properly and mount ewes comfortably during breeding. A breeder should have sound knowledge of external anatomy of ram for making visual selection

*Corresponding author's E-mail: escritor005@gmail.com
[1]Department of Sheep Husbandry, Shrinagar-190 002, Jammu and Kashmir, India.
[2]Sher-e-Kashmir University of Agricultural Sciences and Technology Kashmir, Jammu-180 009, Jammu and Kashmir, India.

decisions. Each part has an ideal characteristic for breeding rams. An ideal breeding ram should possess certain physical characteristics or visual traits mentioned below.

Health

The breeding ram should be of sound health and free from any disease. A healthy and sound ram is bright, alert and does not separate from the rest of the flock. Rams with abscesses, pink eye, mouth lesions, respiratory distress (Hassani *et al.* 2014), extremely poor body condition, chronic diarrhea, bottle jaw, sheep pox *etc* should not be selected for any breeding program. The breeding ram should be screened for contagious diseases in particular Brucellosis, Listeriosis *etc.*

Mouth

Mouth defects affect grazing and feeding, hence overall health status and breeding behavior of ram. In normal sheep incisor teeth come close to end of dental pad. The breeding ram should be checked for overshot jaw or parrot mouth (lower jaw is too short) and under short jaw or monkey mouth (lower jaw is too long). Both jaw conditions are inherited defect hence ram with any of these defects should be avoided (Hassani *et al.,* 2014).

Teeth

The condition of ram's teeth depend upon its diet. Animals on a rough, coarse diet will grind their teeth away faster than animals on an easily eaten diet. The molar teeth are far more important than the incisor teeth as they do the grinding of feed. Ram with bad breath and sloppy mouths may have teeth problems (Hassani *et al*. 2014). Animals with teeth problems should be not selected or retained for breeding.

A structurally sound ram has the ability to breed ewes on the terrains of production facility, will survive and be productive for a longer time than an animal which has physical problems (Hassani *et al.,* 2014). An ideal breeding ram should possess certain physical traits presented in Table 1. However, some physical deformities (Table 1) reduce or make ram unfit for selection in a breeding program.

Considerations while assessing a ram

Following are some of the conditions which a breeder must keep in mind while selecting a ram for breeding:

Age

The reproductive age of a ram is 7 to 9 years. The sheep is a seasonal breeder and a ram can serve 30 to 50 ewes in a season. Kashmir Merino ram attains sexual maturity at 1.5 to 2 years. Therefore, a breeder can select a Kashmir Merino ram at age of 1.5 to 2 years.

Bowlegged

A sheep, if viewed from front and its knees bend out away from each other or viewed from the rear and its hocks bend out away from each other, is bowlegged (Melanie, 2021).

Buck kneed

An animal is buck kneed, or "over at the knees", when observed from the side, the legs appear slightly bent. The condition will prevent full extension of the animal's knee and is usually seen the rams too straight at the shoulder (Melanie, 2021).

Calf kneed

Calf kneed is the opposite of buck kneed. This means that the animal stands "back at the knees" when viewed from the side (Melanie, 2021).

Cow hocked

A ram is cow hocked if hocks are turned inward or are placed too close together when viewed from rare.

Cryptorchidism

One or both testes not descended.

Knock-kneed

A sheep is knock-kneed if its knees lean towards each when viewed from the front (Melanie, 2021).

Pigeon toed or toed-in

A sheep when viewed from front, its toes turn towards each other instead pointing straight forward (Melanie, 2021).

Post legged

A ram is post legged if the hock has too little angle or set (Melanie, 2021).

Sex character

Ram should appear rugged, stout and masculine (Hassani *et al.,* 2014).

Sickle hocked

A ram is sickle hocked if the hock has too much angle or set when viewing the rear legs from the side. The cannon bone lies in a parallel line dropped perpendicular from the pin bones to the ground (Melanie, 2021).

Splayfooted or toed-out

A sheep when viewed from front, its toes turn away from each other instead pointing straight forward (Melanie, 2021).

Testicles

Rams with small testicles should not be selected for breeding as there are correlations between a ram's scrotal size and the reproductive performance of his daughters (Hassani *et al.,* 2014) and scrotal size semen quality (Awgichew, 2007).

Weak pasterns

In this condition pasterns (leg bones between the hoof and fetlock) have more than the normal slope and can indicate a structural fault. Correct pastern angle should be approximately 50 to 55 degrees or slightly more (Melanie, 2021).

Table 1: External body parts of ram.

Trait	Should have	Should not have
Face	Broad and long, open-faced, healthy eyes	Wool blind entropion, inverted eyelid
Fore head	Masculine	
Poll		
Neck	Masculine, long	
Breast	Trim neat throat and breast	
Top of shoulder	Smooth	
Shoulder	Smooth	
Point of shoulder		
Elbow		
Forearm		
Knee		Bowlegged, knock-kneed, buck kneed, calf kneed
Cannon	The diameter should be adequate	
Dew claw		
Foot or hoof		Abnormal or excessive hoof growth, cracked hooves, or extremely splayed hooves
Fore rib	Deep	
Lower rib		
Rib	Well-sprung ribs, or in other words a round rib cage with large	
Back or top	Wide, straight	
Middle		
Rear flank		
Loin	Long and wide, thickly muscled	
Hip		
Rump	Long, square and level	
Dock		
Leg	Straight, set squarely under the corners of the body, very close tohocks or very widely apart or bowed. Strong feet and pasterns guarantee a long, productive life of a ram.	
Hock		Bowlegged, cow hocked, sickle hocked, post legged
Pastern	Strong and upright	Weak pasterns
Testicles	Well-developed, firm, evenly sized and moving freely within the scrotum	Cryptorchidism, split scrotum testes of uneven size Scar tissue in testes
Scrotum	Scrotal circumference should be average or above average within breed	Below average
Toes	Pointing straight forward	Pigeon toed or toed-in, splayfooted or toed-out
Skin folds	Absent or minimum	
Legs	Thickly muscled, placed directly underneath the animal's body,	Should not be very close at hocks, very widely apart, bowed.
Side	Deep	Narrow, flat
Top	Wide	
Body	Deep and round	Shallow
Horns	Growing away from their head	Not growing close to head or piercing the head
Skeletal size	Large-framed	
Wool	White, fine, long and dense	Kemp and medulated fibers
Skin	Free from skin folds	
Body	A long, well balanced body, with adequate skeletal size.	

Source: (Awgichew, 200; Melanie, 2021).

Wool

The wool should be evaluated at yearling stage (Hassani *et al.,* 2014).

Selecting breeding ram on the basis of performance

Selecting breeding ram based on performance records is usually more predictive of its future performance than looking at its morphology. The performance of a sire and survivability of its offspring cannot be judged merely by looking at him. Therefore, it is essential for an animal breeder to have production records. Any sheep breeder/ farmer can keep on-farm performance records. All that is needed is some form of individual animal identification, a record book and a scale. Birth dates, birth type, monthly body weights up to 18 months, wool yield and body weight at tupping should be recorded. The body weights at different ages should be corrected to a common age and adjusted for birth type, parity, season of birth, year of birth and age and weight of dam at tupping of dam. Otherwise, lambs with an environmental advantage will be favored in the selection process. Selection should favor the lambs with the heaviest adjusted weaning weights from dams with the heaviest litter weights. Similarly, depending upon the production system twin and triplet-born ewe lambs should also be favored, unless multiple births are a disadvantage in the production environment. At the same time, it is important to only compare lambs from the same contemporary group (group of animals of similar age that have been reared together with the same management and feeding).

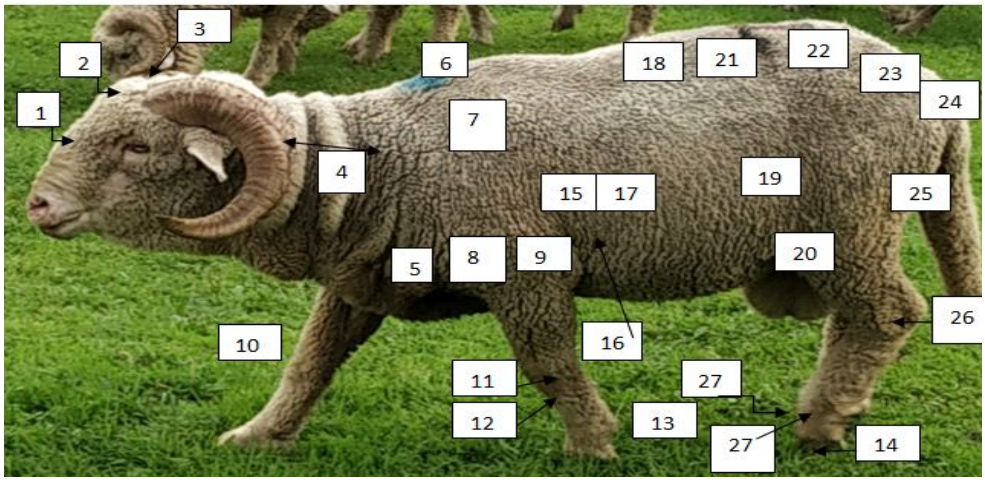

Fig 1: External body parts of ram.

Table 2: Traits of interest to be considered while selecting breeding ram.

Growth traits	Wool traits	Reproduction traits**	Carcass traits	Health traits
Birth weight	Wool yield at 6, 12 and 18 months	Conception rate	Dressing percentage	Mortality and morbidity rates
Weaning*	Fibre diameter,	Number of lambs born per	Rib-eye (loin-eye) area	Tolerance or resistance to parasitism
6-month weight	Staple length,	Number of lambs weaned per ewe	Fat thickness over the rib-eye	Disease resistance
12-month weight	Crimps per inch,	Lambing percentage	Lean: bone: fat ratio or %	
18-month weight	Modulation percentage	Weaning percentage	Carcass conformation and muscling	
Pre-weaning average daily gain (ADG)	Clean wool yield	Litter size and weight		
Post-weaning ADG		Fertility or birth problems		
Feed efficiency		Ewe weight at weaning		
Metabolical weight		Age at first lambing		
Kleiber ratio		Inter-lambing interval		
Body conformation		Age at sexual maturity		
		Scrotal circumference of the rams		

*Weaning weight at 90 day weight, **Reproduction traits will be considered in pedigree selection.

Traits of interest

Traits of interest to be considered while selecting breeding ram based on performance and EBV are presented in Table 2. The traits can be classified into categories such as growth traits, carcass traits, wool traits, reproduction traits and maternal traits. Growth traits include birth weight, Weaning weight, six month body weight, one year body weight, 18 months body weight, average daily gains, metabolic weight, Kleiber ratio *etc* while carcass traits include loin depth (or size), fat thickness carcass yield.

Maternal traits often include number lambs born and number lambs weaned and scrotal circumference of the rams, because rams with larger scrotal size tend to improve sire ewes with improved reproductive performance. Wool traits include average wool yield, fibre diameter, staple length, crimps per inch, modulation percentage *etc.* The reproduction traits include age at first lambing, age at sexual maturity etc of its female progeny. Once the desired traits in a ram have been identified, then the selection process begins. The breeder should include many traits simultaneously for optimum genetic gain as single trait selection is time consuming and often results in decreased desirability and loss of other important economic traits.

EBV (expected breeding value)

An EBV is the true genetic potential or genetic value, genetic worth (genetic transmitting ability of animals) (Rather *et al.* 2019) is an estimate of the superiority that will pass onto its progeny. The accuracy of selection depends on the variability of breeding values (Kinghorn, 1997). The EBV is used to make comparisons across flocks. EBVs are calculated for various growth, maternal, fitness, wool and carcass traits. The environmental factors mask the EBV of an animal. Therefore, knowledge of the effect of non-genetic factors on performance traits allows a more accurate assessment of breeding values (Momoh *et al.,* 2013). The EBV of a lamb for weaning weight if a lamb's parents have EBVs of +2 kg for weaning weight, this means the lamb will be 2 kg (on-average) heavier than the average of the breed. The production records from the past few years can be used to estimate estimated breeding values (EBVs).

Adjusting body weights at different ages

The observed performance of each animal is the result of its genetic worth and the environment (Babar *et al.,* 2003). The environmental or non-genetic factors influence the phenotypic expression of sheep (Dixit *et al.,* 2011). Therefore, these non-genetic factors cause differences in the expression of economically decisive traits (Babar *et al.,* 2003). Identification and exploration of these non-genetic and correction of records for these factors cause estimated genetic worth of animal (Rashidi *et al.,* 2008). Therefore, it is essential to adjust the body weights of sire for age and other-non-genetic factors. The following simple multiplicative procedure is used for normalization of body weights (at different ages) to a constant:

$$Wc = [(W-BW)*C/D] + BW.$$

Where,

W_c = Corrected body weight at a constant age.
BW = Birth weight.
C = Constant age.
W = Body weight of an on the date weighment was made.
D = Age of animal at the time of weighing (Talebi, 2012).

CONCLUSION

A breeder should select a breeding ram based on performance records and EBV and due consideration should be given to visual traits during the selection process. The EBV should be measured and accurately evaluated from adjusting data for different economically important traits. Genetic parameters should also take into consideration while selecting a breeding ram. Trait with high heritability and favorable correlation with other traits should be identified and used as selection criteria. The pedigreed ram should be selected and preferred over a non-pedigreed one for breeding programs.

REFERENCES

Awgichew, K. (2007). Selecting breeding stock for sheep production. Technical Bulletin No. 4.

Babar, M.E., Ahmad, Z. and Hussain, A. (2003). Heritability estimates of birth and weaning weight in Lohi sheep. Pakistan Journal of Agricultural Sciences. 40: 214-216.

Dixit, S.P., Singh, G. and Dhillon, J.S. (2011). Genetic and environmental factors affecting fleece traits in Bharat Merino Sheep. The Indian Journal of Animal Sciences. 81(1): 80-83.

Falconer, D.S. (1960). Introduction to Quantitative Genetics. Oliver and Boyd, Edinburgh and London. 365 S., 35 s.

Hassani, M.T., Taj, M.K. and Taj, I. (2014). Breeding ram selection and its role in improvement of Balochistan sheep breeds. International Journal of Innovation and Scientific Research. 9(9): 255-257.

Kinghorn, B.P. (1997). Genetic Improvement of Sheep. In: The Genetics of Sheep. [Piper, L. and Ruvinsky, A. (Eds).], CAB International UK. 565-591.

Melanie, M. (2021). Ram Selection Principles: Objective analysis of the ewe flock will help a producer determine what characteristics a ram should possess to best complement a flock to improve performance. meh7@psu.edu. Accessed on 10/05/2021.

Momoh, O.M., Rotimi E.A. and Dim, N.I. (2013). Breed effect and non-genetic factors affecting growth performance of sheep in semi-arid region of Nigeria. Journal of Applied Biosciences. 67: 5302-5307.

Rashidi, A., Mokhtari, M.S., Jahanshahi, A.S. and Abadi, M.M. (2008). Genetic parameter estimates of pre-weaning growth traits in Kermani sheep. Small Ruminant Research. 74(1): 165-171.

Rather, M., Shanaz, S., Ganai, N., Baba, M., Hamadani, A., Ahmad, M. and Ahmad, T. (2019). Genetic, phenotypic and environmental trends for production and reproduction traits in kashmir merino sheep. International Journal of Livestock Research. 9(12): 73-78. doi: 10.5455/ijlr. 2019 0510100655.

Rather, M.A. (2019). Genetic evaluation of Kashmir Merino Sheep at organized farms. (M.V.Sc. thesis. Division of Animal Genetics and Breeding Faculty of Veterinary Science and Animal Husbandry, Sher-e- Kashmir University of Agricultural Sciences and Technology of Kashmir).

Talebi. (2012). Heritability estimates for some growth traits and Kleiber ratios in Karakul sheep. Indian Journal of Animal Sciences. 82 (6): 620-623.