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Animal Husbandry Practices for Good Wool Production

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Abstract:

Wool production is an important component of the sheep industry, providing livelihood opportunities to millions of rural households while supporting the textile and carpet sectors. The quality and quantity of wool largely depend on the adoption of Good Animal Husbandry Practices (GAHP). This article highlights key management practices, including balanced nutrition, preventive health care, vaccination, scientific housing, proper shearing, genetic improvement, climate management, and animal welfare, that collectively enhance wool yield and fibre quality. The adoption of these scientific practices can improve flock productivity, increase farmers' income, and promote sustainable wool production. Strengthening these management interventions, along with value addition and organized marketing, will help improve the competitiveness of the Indian wool sector and ensure long-term sustainability.

Keywords: Animal welfare, Good Animal Husbandry Practices (GAHP), Nutrition, Sheep health, Shearing, Wool production, Wool quality.

Introduction:

Although sheep rearing is known to us since early civilization, sheep is considered as a future animal for rural prosperity under the current scenario of climatic conditions and limited grazing resources. Sheep can adapt to wide range of climate conditions and requires minimum inputs. Sheep rearing is especially beneficial to small and marginal landholders and farmers. Post-harvest products of sheep such as wool and mutton play an important role in the socioeconomic life of India. They are an industrial commodity. There are ample opportunities of value addition to wool. Thus, it is an important tool of poverty alleviation. The majority of sheep flocks are maintained on a common property resource by employing family members with little capital, resources, and traditional knowledge (Shinde, 2021). India is a rich depository of sheep genetic resource with 45 well-defined breeds and nondescript animals, well adapted to different agro-climatic conditions of the country. As per the recent 21st livestock census, India

has 74.26 million sheep, contribute 678 million kg of mutton, 33.69 million kg of wool (BAHS 2024), 31 million kg manure, and 41.6 million pieces of skin. About 100 million kg of wool is imported to meet the demand of woollen industries. Carpets worth 10000 cores are exported from the country. Sheep husbandry employs 6 million people in various sectors of sheep production, wool processing, live animal trading, and meat processing with these current animal husbandry practices being followed in for sheep rearing.

GAHP: Good Animal Husbandry Practices:

GAHP encompasses all the measures adopted at the farm level starting from rearing of healthy wool animals for good quality wool production. The measures that form a part of GAHP in relation to good quality wool production are discussed under following sections:

1. Nutrition for Wool Production:

Balanced nutrition is the foundation of quality wool production, as wool is primarily composed of protein rich in sulphur-containing amino acids. Adequate dietary energy supports continuous wool growth, while sufficient protein promotes keratin synthesis and improves fibre strength and yield. Essential minerals, particularly sulphur, copper, zinc, and iodine, play important roles in wool follicle development, fibre pigmentation, and overall wool quality. Vitamins such as A, D, biotin, and B-complex vitamins also support healthy follicle function and wool growth. Therefore, providing sheep with a balanced diet containing adequate energy, protein, minerals, and vitamins is a key Good Animal Husbandry Practice (GAHP) for maximizing wool production and maintaining superior fibre quality.

2. Sheep Health and Vaccination:

The quality and quantity of sheep produce are not independent of sheep health. Like that of all other domestic animals, in sheep also, health is a priority for sustained production and profit. "Healthy sheep" would be an asset that can multiply. "Sick sheep" turns out to be a liability that too can multiply. "Healthy" sheep implies animals that are reasonably free from illness and perform better in their reproduction. Profit in a sheep farm depends upon the production of marketable wool and mutton. The quality of wool should be corresponding to the amount of feed provided to them.

Herd medicine is the preventive veterinary medicine that is suitable for sheep. Similar to poultry birds, sheep maintain close contact hence spread of disease is rapid. At the same time, they share similar management and materials. Individual animal treatment is essential in high value animals and ethical management situations. Preventive health measures are not limited only to vaccination. Even, timely provision of water to thirsty animals would reduce the incidence of climatic stress, salt poisoning, and sunstroke.

Deworming the sheep that are taken for grazing in a pasture contaminated with haemonchus is also a major preventive measure. Dipping has been a part of healthcare in sheep because sheep and goats have always been suitable hosts for seasonal and perennial external parasites. Although there are effective treatment and control measures, sheep farmers often complain that their animals are getting reinfected even after treatment. Severe infestation with Tick, fleas, and mites can cause anaemia and production loss. These microscopic insects are capable of damaging the skin and become a common cause of weight loss in sheep. Lush growth of pasture after monsoon is conducive for tick reproduction and questing for the host. Hence dipping is scheduled according to the increase in the tick population. The schedule of dipping in India is - sheep can be dipped immediately before the post-winter shearing and/or before the post-autumn shearing. In addition, they can be dipped 1-4 weeks after shearing, when the fleece has grown long enough to retain dip solution and also allow cuts and scratches incidental to shearing time to heal.

→ **Dipping Chemicals:** BHC, Lindane (0.25%), DDT (0.5%), Garathion, Malathion (2.0%), Cimathion, Pyrethrin-arsenic sulphide powder (0.2% arsenic), coal tar-creosote (0.76%), nicotine and tobacco dips (0.1% nicotine, 15 kg tobacco leaves in 500 lit water).

→ **Dipping Tanks:**

a) Hand Bath: In case of small flocks, a tank of galvanized iron (1.2 x 1.0 x 0.5 m) can be used. Sheep can be lifted one by one into the bath and kept for two minutes. The sheep are removed and placed on a drain board to drain off surplus dip back into the dip tank.

b) Swim Bath: In large flocks, the dipping tank can be constructed of metal or concrete. It should be 12 feet long at the top and 6 feet long at the bottom, with a incline for the other 6 feet. The tank should be 2 feet wide at the top, sloping to one foot at the bottom, and it should be 6 feet high. The sheep should be completely immersed in the liquid (including their heads and ears).

Disease	Type of vaccine	Name of vaccine	Frequency	Tentative schedule
FMD	Alumiminium hydroxide trivalent (O,A,ASIA -1) vaccine	Aftovaxpur	Twice a year	March and September
Enterotoxaemia	Alum precipitated	ETV, VRI Lahore	Twice a year	January and July Ewe 7-10 days before parturition
CCPP	It is formalised culture of <i>Mycoplasma mycoides</i>	CCPP vaccine VRI Lahore	Twice a year	May and November
PPR	PPR vaccine	PPR Vac. VRI Lahore	once a year	

Source: *Sheep and Rabbit Production and Utilization Technologies CSWRI 2013*

3. Housing and Building for Sheep Rearing:

Proper housing is an essential component of Good Animal Husbandry Practices (GAHP) for maintaining sheep health, welfare, and productivity. A simple, low-cost shed constructed with locally available materials is sufficient for efficient sheep production. The shed should be oriented in an east-west direction to minimize heat stress and ensure adequate ventilation for keeping the floor dry. Thatched roofs are economical and provide better thermal insulation, while corrugated asbestos or metal sheets may be used in organized farms for greater durability. Gable roofs are preferred for large sheds, whereas lean-to roofs are suitable for small units. The shed floor should be firm, well-drained, non-slippery, and easy to clean, with crack-free walls and continuous access to clean drinking water. The recommended shed width is about 8 m (not exceeding 12 m), with a side wall height of 2.5 m and ridge height of 3.5 m to ensure proper air circulation. An overhang of 75 cm to 1 m protects animals from rain and direct sunlight, while the open paddock may be enclosed with a 4-foot chain-link fence. Sheep maintained under grazing systems require only covered night shelters, whereas intensively reared flocks should be housed under a pen-and-run system with separate feeders and water troughs for concentrates, green fodder, and clean water. Planting fodder trees around the shed further enhances feed availability and improves the farm environment.

4. Shearing Practices for Good Wool Production:

Shearing is a critical management practice that directly influences wool quality and processing efficiency. Machine shearing is preferred over manual shearing as it is faster, minimizes skin injuries, reduces double cutting, and produces a more uniform fleece. Sheep should be washed before shearing, and the fleece must be completely dry to prevent contamination with dust and dirt. During shearing, wool from different breeds and coloured sheep should be collected and stored separately to maintain uniform quality. In India, particularly in Rajasthan, sheep are generally shorn twice a year (March and September), although longer fleece obtained through annual shearing is preferred for certain wool-processing industries. The average annual wool production per sheep in India is about 0.9 kg, which is considerably lower than the global average of approximately 2.4 kg, highlighting the need for improved shearing and flock management practices to enhance wool productivity.

5. Breeding Strategies for Wool Production:

Genetic improvement through planned breeding is essential for enhancing wool yield, fibre quality, and overall flock productivity. Selection of superior indigenous breeds, establishment of elite breeding flocks, and use of genetically superior rams through within-breed selection and open nucleus breeding systems are effective strategies for sustainable improvement. Indigenous carpet

wool breeds such as Nali, Chokla, Magra, Marwari, Patanwadi, Pugal, Gaddi, and Jaisalmeri should be improved through selective breeding to increase fleece weight, fibre fineness, and wool quality. In temperate regions, controlled crossbreeding with fine-wool breeds such as Merino, Rambouillet, and Bharat Merino can enhance apparel wool production, while carpet wool production should continue to focus on arid and semi-arid regions. Selection criteria should include greasy fleece weight, fibre quality, and reduced medullation, along with conservation and genetic improvement of indigenous breeds to ensure sustainable and profitable wool production.

6. Climate Requirements for Good Wool Production:

Climate is a key environmental factor affecting wool growth, fibre quality, and sheep productivity. Exposure to high ambient temperatures reduces feed intake, alters metabolic and immune functions, and negatively affects wool production, whereas low skin temperatures can decrease wool fibre growth by reducing blood flow and nutrient supply to hair follicles (Sahoo *et al.*, 2013). Although weather has limited direct effects on fleece growth in unshorn sheep, it indirectly influences wool production through changes in feed intake, water quality, and animal health (Sejian *et al.*, 2014). Heat stress can be minimized by providing adequate shade, clean drinking water, and supplementation with minerals and antioxidants such as selenium, which improve thermotolerance and reproductive performance (De *et al.*, 2017). In addition, seasonal changes in day length regulate wool growth through hormonal mechanisms, resulting in natural variations in fleece growth rate and fibre characteristics (Hutchinson, 1999).

7. Animal Welfare for Wool Production:

Animal welfare is a fundamental aspect of Good Animal Husbandry Practices (GAHP) and plays a significant role in maintaining wool quality, animal health, and farm productivity. Sheep should be handled gently and calmly throughout their life, particularly during shearing, transportation, and routine management, to minimize stress and injury. Shearing should be carried out by trained and skilled shearers using proper equipment and techniques to reduce the risk of skin cuts, bruising, and handling stress. Any wounds or injuries should be treated promptly with appropriate veterinary care and pain relief when required. Clean and well-maintained shearing sheds, proper restraint, adequate nutrition, access to clean drinking water, protection from extreme weather, and regular health monitoring further enhance animal welfare. Adoption of humane handling practices and good stockmanship not only improves the well-being of sheep but also enhances fleece quality, production efficiency, and the sustainability of the wool industry.

Conclusion:

Sustainable wool production depends on the adoption of scientific Good Animal Husbandry Practices (GAHP), including balanced nutrition, genetic improvement, effective health management,

proper housing, scientific shearing, and animal welfare. Improving the productivity and wool quality of indigenous sheep through selective breeding, efficient disease control, and better flock management can enhance farmers' income and reduce dependence on imported wool. Adoption of machine shearing, wool grading, and organized marketing systems can further improve the economic value of wool. In addition, value addition and the development of innovative products from coarse indigenous wool will increase market demand and ensure the long-term sustainability and profitability of the sheep and wool sector.

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