



# Effect of Herbal Additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) on Carcass Traits of Magra Lambs in the Semi Intensive Management System under the Arid Zone of Western Rajasthan

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

**Aim:** It was the objective of this study to determine whether the highly nutritious herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) impacted carcass traits of Magra lambs in the semi intensive system of management.

**Study and Design:** The experiment involved 28 lean lambs between the ages of three and four months under a semi intensive system, distributed at random into four experimental groups of seven lambs each, according to the randomized block design.

**Place and Duration of Study:** The campus is located at 236 meters above mean sea level in the heart of the Thar Desert at 28° 18' 0" N (28.3° N) latitude, 73° 30' 0" E (73.5° E) longitude and 28° 18' 0" N (28.3° N) latitude. The duration of experimental study was thirteen weeks.

**Methodology:** In a semi-intensive management system, groups T<sub>1</sub> and T<sub>2</sub> received an oral/feed supplement consisting of 1.5g/kg body weight of Amla (*Emblica officinalis*) fruit powder with seed and Giloy (*Tinospora cordifolia*) stem powder, respectively, along with concentrate, excluding the control group and T<sub>3</sub>. Group T<sub>3</sub> group received an oral/feed supplement comprising a combination of Amla (*Emblica officinalis*) fruit powder and Giloy (*Tinospora cordifolia*) stem powder at a dosage of 0.75g/kg body weight, along with concentrate.

**Results:** At the end of experiment, no significant changes were found in carcass traits except hot and cold carcass weight though; they were within normal range.

**Conclusion:** At the end of experiment it appears that incorporation of 1.5g/kg body weight Giloy stem powder can be used as a part of the strategy as it is effective to alleviate stress in lambs in the semi-intensive system of arid zone of Rajasthan.

**Keywords:** Magra; hot carcass weight; cold carcass weight.

## 1. INTRODUCTION

Shepherds in western Rajasthan have traditionally carried out sheep farming in an arid zone since the mid-19<sup>th</sup> century. Through the sale of wool and livestock, shepherds are able to earn a dependable source of income. The Magra sheep is found in Rajasthan's districts of Bikaner, Nagaur, Churu and Jhunjhunu. In addition to possessing the unique characteristic of lustrous carpet wool, Magra sheep are well known for their carpet wool. It is very important for the carpet industry to use Magra wool because of its lustrous properties. As a result of its lustrous properties, Mahagra wool has been extremely popular in carpeting for some time now. As a result of an increase in economic status, a growing population in mega and metropolises, a growing trend of eating at restaurants and hotels, and a rising demand for quality meat products, the demand for chevon is growing quickly. It is possible to improve weight gain and feed efficiency significantly in lambs by providing them with balanced nutrition and feeding. The field-grown lambs achieve an average body weight of 8-10 kg at three months of age and 16-18 kg at six months, whereas the same lambs under intensive feeding can attain a weight of 30-30 kg at 6 months of age. The major objective of lamb production is to maximize growth by using improved feed efficiency and the optimum meat

yield and quality through the application of improved feeding practices. The amount of meat produced in India is eighth highest in the world [1]. The total meat production in Rajasthan is 240.28 thousand tonnes for the year 2022-23 with an annual growth rate of 8.92%. The per capita availability in Rajasthan reached at 3.00 Kg/Annum the year 2022-23 (BAHS-2023). Sheep contributes 10.51% in total meat production of India. In Rajasthan 4508.16 thousand sheep were slaughtered to get the 53.54 thousand tonnes of chevon.

## 2. MATERIALS AND METHODS

The experimental trial was conducted to see the effect of herbal feed additive Amla (*Emblica officinalis*) fruit powder with seed and Giloy (*Tinospora cordifolia*) stem powder on wool quantity and quality of Magra lamb under semi-intensive system in Arid region of Rajasthan. The present experiment was conducted for three months at Arid Region Campus of ICAR, Central Sheep and Wool Research Institute, Bikaner for semi-intensive system. "Lambs of all groups were kept on basal diet (grazing for a period of 6 hours + ad lib fodder + 300 g concentrate per lamb per day in the semi intensive system. The lambs were randomly distributed into four experimental groups of seven lambs in each group in semi-intensive system in a randomized

block design (RBD) in such a manner that the initial body weights were remain similar in all the groups. Herbal feed additive Amla (*Emblica officinalis*) fruit powder with seed and Giloy (*Tinospora cordifolia*) stem powder were supplemented at level of 1.5g/kg body weight with concentrate as oral/feed supplemented in T<sub>1</sub> and T<sub>2</sub> group, respectively except control group and T<sub>3</sub> in semi-intensive management system. Group T<sub>3</sub> were supplemented with the combination of Amla (*Emblica officinalis*) fruit powder and Giloy (*Tinospora cordifolia*) stem powder at the level of 0.75g/kg body weight with concentrate as oral/feed" [2].

At the end of the experiment, all animals were slaughtered at a commercial abattoir after being fasted for 24 h as reported previously [3]. Carcasses were immediately weighed to obtain the hot carcass weight. Then, carcasses were cut into halves along the midline and the right sides were dissected. Longissimus dorsi (LD) muscle pH was measured between the 12th and 13th ribs at 45 min with a portable pH meter (Schott L 6880, Lab Star pH, Mainz, Germany). Finally, Longissimus thoracis (LT) muscle was cut out from the left side of each carcass and samples were taken and kept at -20 °C until analysed for chemical composition of Longissimus dorsi muscle. The live body weight of animal before fasting and ready to slaughter. An empty body weight, the body weight after excretion of the contents of the digestive organs, the contents of the bladder with the help of fasting and to facilitate the slaughter process. It represents actual mass of animal body. The dressing percentage live body weight is the portion of the live animal weight that results in the hot carcass. The dressing percentage is the portion of the empty animal weight that results in the hot carcass. The hot carcass weight (HCW) is the weight of the unchilled carcass in kilograms within one hour of slaughter after the head, hide and internal organs have been removed. The weight of the chilled carcass in kilograms. Cold carcass weight was determined by keeping the carcasses at +4°C for 24 hours. Animals were slaughtered by Halal method in the Abattoir of the Bikaner Municipal Corporation. Samples of Longissimus dorsi (LD) muscle were collected from the loin area. Additionally, samples of lung, heart, kidney and liver were collected from Magra lambs.

### 3. RESULTS AND DISCUSSION

The meat has properties that can meet the expectations of a consumer who is increasingly

aware of the health and nutraceutical aspects of food. In fact, small ruminant meat is an important protein source with high biological value and contains some compounds that are considered bioactive such as taurine, carnosine, coenzyme Q, creatine and creatinine. According to BAHFS statistics 2023 [4], the average yield per animal is only 9.05/kg/animal. This is due to the animals being fed nutrient-poor diets, resulting in lower growth rates and lower meat yields. In addition, many animals are kept in overcrowded and unsanitary conditions, further contributing to lower meat yields.

#### 3.1 Carcass Characteristics

The total meat production in the country is 9.29 million tonnes for the year 2021-22 with an annual growth rate of 5.62%. This is due to the increasing demand for meat products from the domestic market, as well as from the export market. The growth rate is indicative of a steady increase in production over the years.

To evaluate the characteristics of sheep carcasses, the main variables that were used are the dressing percentage, the cuts weight, the conformation and the fatness [5]. Therefore, in the present study, the parameters of meat that can be influenced by supplementing various plant-based herbal feed additives with the diet were examined and the results were presented in Table 1 for the semi-intensive system.

#### 3.2 Pre Slaughter Weight (kg)

The overall mean values of pre slaughter weight (kg) were found to be 20.95, 21.70, 21.75 and 21.34 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of different feed herbal additives within the diet of experimental lambs.

#### 3.3 Empty Body Weight (kg)

The overall mean values of empty body weight (kg) were found to be 17.98, 19.15, 19.66 and 18.60 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of different feed herbal additives within the diet of experimental lambs.

**Table 1. Effect of herbal additives on carcass characteristics in lambs in different treatment groups in the semi-intensive system**

Treatment groups	Pre slaughter weight (kg)	Empty body weight (kg)	Hot Carcass weight (kg)	Cold Carcass weight (kg)	Dressing percentage (%) L.W.	Dressing percentage (%) E.W.	Non carcass components				
							Liver (kg)	Heart (kg)	Lung (kg)	Kidney (kg)	Head (kg)
C	20.95	17.98	9.10 <sup>a</sup>	8.90 <sup>a</sup>	43.60	50.72	0.36	0.13	0.62	0.040	1.210
T <sub>1</sub>	21.70	19.15	10.08 <sup>b</sup>	9.87 <sup>b</sup>	46.55	52.89	0.38	0.15	0.63	0.041	1.270
T <sub>2</sub>	21.75	19.66	10.33 <sup>b</sup>	10.21 <sup>b</sup>	47.59	52.64	0.42	0.16	0.66	0.047	1.320
T <sub>3</sub>	21.34	18.60	9.64 <sup>ab</sup>	9.48 <sup>ab</sup>	45.39	52.08	0.41	0.15	0.65	0.044	1.290
SEM	0.186	0.362	0.268	0.281	0.855	0.486	0.014	0.006	0.009	0.002	0.023

Note: Means with different superscripts in a column differ significantly

### 3.4 Hot Carcass Weight (kg)

The overall mean values of hot carcass weight (kg) were found to be 9.10, 10.08, 10.33 and 9.64 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. Statistical analysis of the variance due to the effect of treatment revealed a highly significant effect (P<0.01) on the overall hot carcass weight at the end of experiment and the highest overall hot carcass weight was observed in T<sub>2</sub>, which was though comparable with T<sub>1</sub> and T<sub>3</sub> in statistical terms, but significantly higher than control.

### 3.5 Cold Carcass Weight (kg)

The overall mean values of hot carcass weight (kg) were found to be 8.73, 9.01, 9.09 and 8.81 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. Statistical analysis of the variance due to the effect of treatment revealed a highly significant effect (P<0.01) on the overall hot carcass weight at the end of experiment and the highest overall hot carcass weight was observed in T<sub>2</sub>, which was though comparable with T<sub>1</sub> and T<sub>3</sub> in statistical terms, but significantly higher than control.

### 3.6 Dressing Percentage (%) L.W.

The overall mean values of dressing percentage L.W. (%) were found to be 43.60, 46.55, 47.59 and 45.39 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. The statistical analysis of variance revealed no significant effect of

supplementation of different feed herbal additives within the diet of experimental lambs.

### 3.7 Dressing Percentage (%) E.W.

The overall mean values of dressing percentage L.W. (%) were found to be 50.72, 52.89, 52.64 and 52.08 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of different feed herbal additives within the diet of experimental lambs.

### 3.8 Non Carcass Components

#### 3.8.1 Liver (kg)

The overall mean values of liver weight (kg) were found to be 0.36, 0.38, 0.42 and 0.41 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of different feed herbal additives within the diet of experimental lambs.

#### 3.8.2 Heart (kg)

The overall mean values of heart weight (kg) were found to be 0.13, 0.15, 0.16 and 0.15 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of different feed herbal additives within the diet of experimental lambs.

### 3.8.3 Lung (kg)

The overall mean values of lung weight (kg) were found to be 0.62, 0.63, 0.66 and 0.65 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of different feed herbal additives within the diet of experimental lambs.

### 3.8.4 Kidney (kg)

The overall mean values of kidney weight (kg) were found to be 0.040, 0.041, 0.047 and 0.044 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of different feed herbal additives within the diet of experimental lambs.

### 3.8.5 Head (kg)

The overall mean values of head weight (kg) were found to be 1.210, 1.270, 1.320 and 1.290 in lambs of control, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> treatment groups, respectively under semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of different feed herbal additives within the diet of experimental lambs.

The findings of the present study revealed that hot carcass weight and cold carcass weight were affected in semi intensive management system by the supplementation of herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in lamb ration.

The findings are in agreement with the findings of Chaturvedi et al. [6] who reported that carcass weight (kg) tended to increase in finishers under T<sub>2</sub> (16.58) and T<sub>3</sub> (16.70) than under T<sub>1</sub> (14.61), but the variation was not significant. The dressing proportion was similar in three treatments. Lozano-Sánchez et al. [7] also reported no significant effect of polyherbal additive based on *Emblica officinalis* and *Ocimum sanctum* on carcass characteristics of Hampshire × Suffolk lamb in all four treatment groups. Orzuna-Orzuna et al. [8] also reported no significant effect of polyherbal mixture (*Solanum xanthocarpum*, *Hedychium spicatum*, *Curcuma longa*, *Piper longum*, and *Ocimum sanctum*. *S. xanthocarpum*) on carcass characteristics of pelibuey lambs in all treatment groups.

The present findings are contrary to findings of Lobo et al. [9] carcass yield is improved in animals fed up to 2% yerba mate extract; leading to a greater production of a lean tissue, which is recommended for a healthy human diet and desired in the meat industry.

The lambs that were fed the herbal feed additives Amla and Giloy showed significantly higher hot carcass weight and cold carcass weight compared to those that did not receive the additives.

## 4. CONCLUSION

The conclusion of this study is that herbal feed additives Amla and Giloy had no significant effect on carcass traits of magra lambs under the semi intensive system except Hot and Cold carcass weight. Many other factors such as genetics may have played a vital role in the results. Further research may be needed to explore alternative methods of improving carcass characteristics in the magra lambs under the semi intensive system.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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