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Effect of Breed and Thoracolumbar Vertebrae on Carcass Traits of Sheep Breeds of Balochistan

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RRK conducted experiment and wrote the article. HAK designed the experiment. ANK and RAM proofread the article. GMS and MAJ checked references. IAS and MI helped in writing the article.

Key words
Breed, Thoraco lumber vertebrae, Carcass, Sheep, Regression estimates

ABSTRACT

The importance of sheep as meat producing animals is increasing worldwide. However, the meat production traits or carcass traits are not studied well. In this study 8 months old, 120 healthier animals with 30 males from each Balochi, Rakhshani, Harnai and Bibrik sheep breeds were randomly selected from various sheep farms of Balochistan. They were divided into A, B, C and D groups including Balochi, Rakhshani, Harnai and Bibrik sheep breeds respectively, raised under the semi-intensive management system. The results for carcass traits including live body weight, carcass weight, dressing percentage and boneless weight significantly higher (P≤0.0) in Balochi sheep breed followed by Bibrik, Rakhshani and Harnai sheep breed. The result for thoracolumbar vertebrae variation were 20, 18, 18 and 19, Balochi, Rakhshani, Harnai and Bibrik, respectively. It is concluded that Balochi sheep breed carcass traits are better expressed and produce more meat as compared with other sheep breeds whereas, thoracolumbar vertebrae number is positively associated with the carcass weight and carcass quality.

INTRODUCTION

Balochistan covers the 44% of the total land area of Pakistan with small and scattered population. Most of the population is directly or indirectly involved with the livestock especially small ruminants and earn their livelihood by raising sheep and goats. Balochistan mainly consists of barren and deserts with sheep rearing areas including Lasbella, Zhob, and their adjoining districts of Baluchistan (Raziq, 2009). The Balochi sheep breed is fat tailed with black and brown colored, spots on muzzle, medium sized legs with 37 to 32 kg of body weight for male and female, respectively (Sharif, 2001). Harani sheep breed is fat tailed reared for mutton and wool and is commonly found in Zhob, Loralai, Sibi and Quetta district of Baluchistan. It has medium sized white and black colored body with spots on head and ear (SMEDA, 2011). The Bibrik sheep breed is fat tailed, kept for mutton and wool, and is mainly found in Dera Bugti district with brown, black and white colored medium sized body and possess horns (Kaleri *et al*., 2018; Niaz *et al*., 2016). Rakhshani sheep is also fat tailed, meat and milk type breed, commonly found in Rakhshan valley including Jangal, Jang Kharan, Makran and Kalat district of Baluchistan (Afzal, 2004). The role of breed differences in production traits are considered as major genetic resources for enhancing meat quality, quantity and production efficiency, (Koyuncu *et al*., 2021). The carcass can be

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defineed as the part of animal meat which is received after removing the skin, head, feet except kidney fat and kidney. The main factor of meat production is procedure of measuring carcass traits to achieve higher weight in the form of carcass quantity and quality. Unlike other red meat producing animals, these traits are greatly influenced by genetic background of an individual, breed, sex, age, nutrition, pre and post slaughter care of animals. Zhang *et al*. (2017) has reported the effect of the thoracolumbar vertebral number and lumbar vertebral number mainly influenced the thickness of carcass length and height of large and small ruminant. Keeping the view importance of carcass traits and thoracolumbar vertebrae, we have evaluated the effect of breed and thoracolumbar vertebrae variation on carcass traits of sheep breeds of Balochistan.

MATERIALS AND METHODS

In this study, Balochi, Rakhshani, Harnai and Bibrik sheep 30 male animals from each breed were randomly selected and slaughtered at Organic Meat Company, Karachi. Their phenotypic characteristics for breeds confirmation and health status including age was confirmed using the guideline given by Vatta *et al*. (2006).

After slaughtering the carcass traits including carcass weight, dressing percentage, boneless weight and bone weight were measured using the method given by Zaradri *et al*. (2016).

The thoracolumbar vertebraed variation was observed from the deboned part of selected samples of each breed.

RESULTS AND DISCUSSION

Live body weight, carcass weight, dressing percentage and boneless weights in kg of sheep breeds of Baluchistan

A total of 120 sheep, 30 from each breed of Baluchistan were randomly selected.

Table I. Live body weight, carcass weight, dressing percentage and boneless weight (kg) of sheep breeds of Baluchistan.

Breed	Live body weight	Carcass weight	Dressing percentage	Boneless weight
Balochi	33.58±0.37	21.58±0.57	64.26 ±0.44	12.89 ±0.12
Rakhshani	30.87±0.71	18.71 ±0.49	60.60±0.91	8.94±0.19
Harnai	29.87±0.36	17.63±0.33	59.02±0.24	.42±0.13
Bibrik	31.38±0.21	19.80±0.81	59.31±0.65	8.12±0.55

P-value 0.002

The maximum body weight (BW), carcass weight (CW), dressing percentage (DP) and boneless weight (BW) (kg) were observed significantly higher (P<0.05) in Balochi sheep breed followed by Bibrik, Rakhshani and Harnai sheep breeds of Baluchistan (Table I).

The findings of our study are lower as compared with those reported by others (Jafari *et al*., 2014; Lashari and Tasawar, 2013; Achakzai, 2005; Jahan *et al*., 2013; Narita and Kuratani, 2005). The variation between body weight and carcass weight may be due to breed difference, genetic variation, sex, age, feeding regimes and environmental factors. Similar study was conducted by Barone *et al*. (2007), who suggested that feeding pattern, age and breed caused significant differences in carcass quality, quantity and its parts. Moreover, they also stated that different parts of carcass such as shoulder, long leg, breast and neck produced more meat in male animal as compared with female lamb. It has also been reported that that sex has no significant influence on the carcass length, height, quality and quantity. Mushtaq *et al*. (2018) have also reported that age and feeding management are main factors which influence on the live body weight of animal. The results of our study are partially in the favor with the results of Bilal (2004) and Mandell *et al*. (1997), who reported 32. 23 kg live body weight for male and 29.47 kg live body weight for female sheep. Finding of Patrovic *et al*. (2012) and Carniero *et al*. (2007) are relatively lower than those of our study. They revealed that it is not common that all sheep have ability of higher potential for daily weight gain, it therefore crossbreeding program are more effective method to produce as well as improve meat production with increasing better population of sheep that directly influence on the live body weight of animal. Findings of our investigation was supported by Berhan and Arendonk (2006), Priolo *et al*. (2002) and Joy *et al*. (2008), who reported 18.87, 21.15 and 21.18 kg carcass weight in Angora and Namabian sheep breeds. This similarity of result may be genetic factors are same management and feeding pattern were applied at farm. Study performed by Mandell *et al*. (1997) and Zapasnikiene and Nainiene (2002) showed higher carcass weight as compared with current study 22.19, 21.15 kg carcass weight in Tensina and Churra sheep breeds. Their results variation may due to genetic potential, breed difference with different nutritional feed factors, which mainly affected the animal during birth weight and might have relationship with neonatal to adult and carcass length as well as on the carcass growth of sheep. An investigation conducted by Fan *et al*. (2013), reported higher values for dressing percentage 51.73 to 49. 55 kg as compared with our study. It has been reported that production of heavy carcass with favorable quality of consumer is highly profitable for producers, that they can earn maximum amount of profit on selling meat with supplying more mature meat with better characteristics and quality as well as quantity. This difference may be due to

sex of animal, body condition of slaughtered animal, age and live body weight. Study performed by Groeneveld *et al*. (2010) suggested that dressing percentage of slaughter animal is affected by condition of animal body, animal sex and animal age. The results of Fluharty *et al*. (2000) and Zeidan *et al*. (1984), showed that there are large number of factors affecting the dressing percentage and it is difficult to produce more carcass through physical examining of live animal as well as slaughter and carcass. Agnithori (2002) conducted study and reported higher values for dressing percentage as compared to our investigation values in Nijdi sheep breed which were specially raised for meat purpose. The result of our study for boneless weight were observed lower as compared with the findings of study conducted by Achakzai (2005) who reported 7.45 and 8.91 kg of boneless weight in two different sheep breeds. This variation might be due to genetic and higher nutrition efficiency feeding practices which may result in higher boneless weight among the breeds. Another study performed by Gaili and Ali (1985) reported higher values for boneless weight for animals having long legs while animal have smaller legs and less amount of boneless weight were observed. These differences may be due to breed and genetic makeup of animal.

Thoracolumbar vertebrae number

The number of thoracolumbar vertebrae in Balochi, Rakhshani, Harnai and Bibrik sheep breed was recorded as 20, 18, 18 and 19, respectively. These results showed that higher number of thoracolumbar vertebrae were observed in Balochi breed followed by Bibrik, Rakhshan and Harnai sheep breeds of Balochistan.

In our study variation in thoraco lumber vertebral number was ranged from breed to breed. The thoracic vertebral ranged 12 to 14 and lumber vertebral ranged 5 to 7. Zhang *et al*. (2017) conducted study and showed analysis that thoraco lumber vertebrae number directly influenced on the carcass length and carcass weight positively. They reported that influence of thoraco lumber vertebrae number was observed more prominent on carcass weight and carcass length ($P \leq 0.01$). The findings of Hirose *et al*. (2013), discussed with other researchers and result that thoracic vertebrae and lumber vertebrae number independently and directly associated with carcass length. However, the influence of thoraco lumber vertebrae and lumber made larger carcass as compared with less number. It has been reported that increased in an extra number of thoraco vertebrae increased the length of carcass about 17 mm with an extra number of lumber vertebrae Roher *et al*. (2015). It has been reported that similar number of vertebrae has no or little bit influence on the carcass weight and length but increased in the region of thoracic vertebrae region positively effect on the carcass weight and length with supporting the longissimus muscles length that mainly linked weight of this muscle and also increased Safadarain *et al*. (2008). The results showed that increased in the number of thoraco vertebrae number will increase the carcass weight, carcass length and carcass width. It is also showed that variation in thoraco lumber vertebral number has positive effect on the carcass weight as well as on the carcass length of sheep breeds.

Table II. Regression estimates among carcass traits of Balochi, Rakhshani, Harnai and Bibrik breed.

	Carcass weight	Dressing percentage	Boneless weight	Bone weight
Balochi sheep				
Live body weight	0.71	0.67	0.69	0.25
Carcass weight		0.59	0.57	0.23
Dressing percentage			0.73	0.27
Boneless weight				0.21
Rakhshani sheep				
Live body weight	0.52	0.61	0.63	0.31
Carcass weight		0.57	0.59	0.29
Dressing percentage			0. 51	0.25
Boneless weight				0.21
Harnai sheep				
Live body weight	0.49	0.57	0.59	0.29
Carcass weight		0.47	0.55	0.33
Dressing percentage			0.39	0.19
Boneless weight				0.24
Bibrik sheep				
Live body weight	0.55	0.67	0.47	0.17
Carcass weight		0.45	0.61	0.19
Dressing percentage			0.41	0.21
Boneless weight				0.13

Regression estimatesamong carcass traits

Table II shows the regression analysis among BW, CW, DP, BMW and BW for Balochi, Rakhshani, Harnai and Bibrik sheep breed. For Balochi sheep the results for regression analysis among BW vs CW, DP, BMW and BW were observed r=0.71, 0.67, 0.69, 0.25 CW vs DP, BMW and BW were observed 0.59, 0.57, 0.23 DP vs BMW and BW were observed 0.73, 0.27 BW vs bone weight was observed 0.21. The results for regression analysis showed strong positive relation among the carcass traits except bone weight of Balochi sheep breed.

For Rakhshani sheep breed the results for regression

analysis among BW vs CW, DP, BMW and BW were observed r=0.52, 0.61, 0.63, 0.31 carcass weight vs DP, BMW and BW were observed 0.57, 0.59, 0.29 DP vs BMW and BW were observed 0.51, 0.25 BMW vs BW was observed 0.21. For Harnai sheep breed the results for regression analysis among BW vs CW, DP, BMW and BW were observed r=0.49, 0.57, 0.59, 0.29 CW vs DP, BMW and BW were observed 0.47, 0.55, 0.33 DP vs BMW and BW were observed 0.39, 0.19 BMW vs BW was observed 0.24. For Bibrik sheep breed the results for regression analysis among BW vs CW, DP, BMW and BW were observed r=0.55, 0.67, 0.47, 0.17 CW vs DP, BMW and BW were observed 0.45, 0.61, 0.19 DP vs BMW and BW were observed 0.41, 0.21 BMW vs BW was observed 0.13.

The results for regression estimates among different carcass traits of sheep breeds of Balochistan were observed strong and positive association. The values for regression estimates were high to moderate and positive among various carcass traits except bone weight which were low to positive. This study was supported by the study conducted by Kaleri *et al*. (2018), who had revealed positive and strong regression estimates among various carcass traits. Similar type of study was performed by Zeidan *et al*. (1984) who reported that low to moderate regression values among carcass traits may be due to various factors influencing on the live body weight including pre and post slaughter care of animal. Other investigations done by Niaz *et al*. (2017), who revealed positive and strong results for regression estimates among various carcass traits except bone weight, which were low to moderate. It has been reported by Roher *et al*. (2015) that increased in one trait would result increased in other trait, whereas in our study increased in carcass quantity would increase bone weight only in Bibrik sheep breed which showed moderate regression result among bone weight and carcass weight that might be due to some environment and genetic factors influencing on the animal body.

CONCLUSION

Based on the present study, it is concluded that comparatively results for various carcass traits were better in Balochi breed followed by Bibrik, Rakhshani and Harnai. The variation in thoracolumbar vertebrae number is positively associated with carcass weight and carcass length.

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IRB approval

The current research study was approved by Directorate of Advanced Studies and Research Board of the Sindh Agriculture University, Tandojam, Pakistan in its 131st meeting held on 13-11-2018, and was notified by Directorate of Advanced Studies Vide Letter No. DAS/5528 dated 28-11-2018

Ethical statement

Ethical Research Committee of the Department of Animal Breeding and Genetics, Sindh Agriculture University, Tandojam approved all the procedures of this study

Statement of conflict of interest

The authors have declared no conflict of interest.

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