

## Correlation and Regression Coefficient Estimate of Baluchi Sheep Breed

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### ABSTRACT

In this study we compare the carcass traits of Baluchi Sheep and estimate the correlation and regression between carcass traits of male and female both breeds. 32 animals of Balochi sheep breeds were selected from two different private livestock farms of Dera Murad Jamali, Baluchi sheep farm at Manjushori has 600 animals whereas notal sheep farm with 500 animals. The animals were divided into two groups A and B. In group A were male whereas in group B females animals of Balochi sheep respectively. Every day 8 animals were slaughtered at Dera Murad Jamali slaughter house and carcass traits were observed. The results revealed that average live body weight of male and female Baluchi was 30.18±1.30 and 27.56±0.34 kg, carcass weight 13.25±0.99 and 11.62±0.44 kg, dressing percentage 44.20±1.55 and 42.86±0.50% and boneless weight 3.66±0.27 and 3.12±0.48 kg, respectively.

Correlation estimates for live body weight vs carcass weight, dressing percentage, boneless weight; carcass weight vs dressing percentage, boneless weight; dressing percentage vs boneless weight of Baluchi were 0.955, 0.799, 0.873, 0.940, 0.831, and 0.690 respectively, where as it was 0.638, 0.374, 0.588, 0.692, 0.603, and 0.498 for Baluchi female.

Regression estimates for live body weight vs carcass weight, dressing percentage, boneless weight; carcass weight vs dressing percentage, boneless weight; dressing percentage vs boneless weight for Baluchi and Bibrik male were 0.91, 0.64, 0.76, 0.71, 0.75, and 0.48 respectively, whereas it was 0.40, 0.38, 0.35, 0.64, 0.30, and 0.21 for Baluchi Female.

It is concluded that Balochi sheep breed carcass traits were found better for fattening purpose and can further be improved through selection and animals with better management.

**KEYWORDS:** Live body weight, Carcass weight, dressing percentage and boneless weight.

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### INTRODUCTION

Livestock play a significant role in Pakistan, share 11.9% in GDP and is a main source of revenue for many farmers. It is expected that there are among 30 to 35 million people in Pakistan's present labour force who are busy in livestock. In 2014, there were approximately 34.6, 39.7, 66.6 and 29.1 million buffalo, cattle, goat and sheep in Pakistan. (GOP, 2014, Javed Ahmed, 2013).

Small ruminants are generally preferred over large ruminants because of their small size and higher reproducibility rate. The importance of small ruminants in particular, has increased many folds in last decades due to the increase of human population. Although, due to the gap in between demand and supply, the price of mutton have increased drastically in last few years. However, Sheep and goat are highly capable to ensure good quality meat supply and also provide animal origin protein.

Small Ruminants contribute to a greater extent to the economy of small farmers. Sheep form an effective complementary component of a livestock farming system. In spite of their importance to Pakistan's economy, sheep have received little attention and poor support. (Hussein *et al.* 2006).

There are 28 breeds of sheep in Pakistan. Variation does exist among sheep breeds, thin tail to fat tail. The small ruminants have lower feed and money requirements than large ruminants, so easily suit to smallholder producers (Devendra *et al.*, 2002). They additionally have shorter generation intervals, little size and are better ready to use an extensive variety of feedstuff, including crop deposits which are of little esteem generally (Holst, 1999). These commitments of sheep guarantee the prosperity of provincial populace and advancement of country, particularly in the parched areas, where crop creation is restricted in this way helping in sparing the nation from financial issues (Hasnain, 1985).

The Baluchi sheep breed is an important breed of Baluchistan province and commonly found in southwest part of Pakistan, eastern Iran and southern Afghanistan. The Baluchi sheep is a fat-tail breed well adapted to a wide range of harsh environmental condition. The balochi sheep is reared for meat, milk and wool purpose. (Yazdi *et al.* 1997).

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The Baluchi sheep breed is live weight at 6 month weight was arrived at the midpoint of  $21.26 \pm 1.31$  kg for male sheep, and for female sheep  $19.15 \pm 0.83$  individually. The normal live weight of Baluchi sheep at 12MW were found as  $30.65 \pm 1.92$  kg for male sheep and  $27.42 \pm 1.04$  kg for female sheep, individually. (Kakar *et al.* 2011).

The generation of Mutton in Pakistan is an auxiliary homestead endeavor and its potential has not yet been completely misused. The present strategies utilized as a part of sheep and goat cultivating, showcasing, butcher, handling and offer of meat, result in low remains yield, extensive misfortunes of by-items and supply of low quality unhygienic meat to customers. The sheep and kid are butchered at low body weight and in incline conditions. Stuffing of these creatures for 90-100 days could include 9-10 kg weight for each body and it will likewise enhance the nature of meat (Pasha, 2006)

A number of factors which examined the value of carcass include weight, composition, pelt condition, physical appearance and health of animals. Among these two economic traits (carcass weight and composition) are utmost important factors which are influenced by environmental conditions, feeding strategies, breeding and selection methods. Moreover the selection play crucial role for improvement of genetic makeup of the breeds by supplying promising genetic material from the population. Selection for carcass characteristics is not usually applied due to the facts that biometric data for carcass traits is not available in limited amount, lack of accuracy in record and many others reasons. Besides this, genetic advantages of the progeny must be predicted by selection for carcass traits belonging to the animals or correlated these traits for better understanding of genetic language (Wolf, 1982).

It is critical to know the diverse elements that can influence the nature of meat and body qualities. Examinations have established that age, sex (Horcada *et al.* 1998; Vergara *et al.* 1999; Barone *et al.* 2007), breed (Crouse *et al.* 1981; Hopkins and Fogarty, 1998; Kremer *et al.* 2004), furthermore the kind of food (Hopkins *et al.* 1995; Jacques *et al.* 2011) can influence the attributes of the carcass.

Keeping in views all above facts, the present research has been designed to study the comparison of carcass traits of Baluchi sheep breed.

## MATERIAL AND METHOD

The present study was conducted to compare the carcass traits of Baluchi sheep male and female. For this purpose, the data were collected from dieferint Balouchi sheep farms Manjushori and Notal at District Naseerabad Balochistan Pakistan. From each gender, 16 animals about 1 year of age were selected on the bases of physical appearance and teeth to know the age using method as described by (Vatta *et al.*, 2006). The animals were divided into two groups A (male animals) and B (female animals). Following slaughter and carcass traits were observed.

Parameters

Live bodyweight

Carcass weight

Dressing percentage

Boneless weight

## METHODOLOGY

### Determination of Live body weight

Before live body weight, animals were checked and examined for the physical health status and clearance of any disease (Anti-mortem). The live weight of each group of animal was recorded before the slaughtering using the digital weighing balance.

### Carcass weight

The animals were slaughtered breed and group wise. Every day two animals were slaughtered as group wise. After slaughtering, animals were dressed out and skinned and carcass was split longitudinally into two halves with four pieces weighed. The right side of each carcass was divided into major cut groups based on their quality into best (fore ribs, best ribs, sirloin, fillet, and round), medium (neck, brisket, shoulder and flat ribs) and inferior (fore shin, flank and hind shank) according to Weniger *et al.*(2003).

### Boneless weight

The cutting up of meat animal carcasses is becoming more popular and utilized by large meat processors is the procedure commonly referred to as "De-boning". The carcass was deboned to obtain boneless meat from the slaughtered animals of present study, for this purpose the hot carcass was left for chilling and shrinkage so that the muscle of the animals becomes hard and compact after that meat of the animals were deboned according to requirement and production standards. After this process the hind limb of carcass from the animals were deboned and remaining boneless meat was measured by digital weighing balance.

**Dressing Percentage**

Dressing is the process of removing the hide, head, feet, and internal organs during harvest (slaughter). What is left is the carcass, which contains the bones, muscle, meat, and fat. The dressing percentage was calculated using the formula described by Mckiernan et al., (2007).

Dressing Percentage = (Total carcass ÷ Total LBW) ×100.

**Statistical Analysis:**

On completion of the study, the data so obtained was tabulate and statistically analyze using computer software named Student Edition of Statistics (SXW), Version. 8.1 (Copyright 2005, Analytical Software, USA). Correlation and regression coefficient between the productive traits of both sheep breed was analyze using method as recommended by Becker (1985).

**Correlation estimates:**

The correlation coefficient between body characteristics and quantitative traits was analyzed statistically with the help of following formula by using STATISTIX 8.1 software package.

$$r_{xy} = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sqrt{\left[\left(\sum x^2 - \frac{(\sum x)^2}{n}\right)\right] \left[\left(\sum y^2 - \frac{(\sum y)^2}{n}\right)\right]}}$$

Where:

- r = Correlation coefficient
- $\sum xy$  = Sum of the product of x and y variables
- $\sum x$  = Sum of x variable
- $\sum y$  = Sum of y variable
- $\sum x^2$  = Sum of the squared value of x
- $\sum y^2$  = Sum of the squared value of y
- $(\sum x)^2$  = Square of sum of x variable
- $(\sum y)^2$  = Square of sum of y variable
- n = Number of records/ observations

The regression of dependent variable, y on independent variable, x was calculate by using the formula:

$$b_{yx} = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$$

## RESULTS

The present study was carried out to compare the carcass traits of Baluchi male and female sheep maintained at Manjushori and Notal at District Naseerabd Balochistan. The studied traits were live body weight, carcass weight, dressing percentage and boneless weight of male and female of sheep. The correlation and regression analysis was worked out between carcass traits. The results are interpreted and presented in Tables 1 to 5 parameter-wise. Comparison of carcass traits between male and female of Baluchi sheep.

The data (Table-1) indicated that average live body weight of male and female Baluchi sheep was  $30.18 \pm 1.30$  and  $27.56 \pm 0.34$  kg, carcass weight was  $13.25 \pm 0.99$  and  $11.62 \pm 0.44$  kg, dressing percentage of  $43.85 \pm 0.01$  and  $42.17 \pm 0.01\%$  and boneless weight was  $3.66 \pm 0.27$  and  $3.12 \pm 0.48$  kg, respectively.

Maximum live body weight ( $30.18 \pm 1.30$  kg) was recorded for male Baluchi sheep as compared female Baluchi sheep ( $27.56 \pm 0.34$  kg).

Maximum carcass weight ( $13.25 \pm 0.99$  kg) was noted in male as compared to female of Baluchi sheep ( $12.18 \pm 0.62$  kg and  $10.90 \pm 0.70$  kg) (Figure-3 and 4).

Dressing percentage was a little higher ( $44.20 \pm 1.55$  % and  $42.86 \pm 0.50$  %) was distinguish in male as compared to female of Baluchi sheep ( $42.86 \pm 0.50$  %).

Boneless weight was slightly higher ( $3.66 \pm 0.27$  kg and  $3.12 \pm 0.48$  kg) was noted in male as compared to female of Baluchi sheep ( $3.12 \pm 0.48$  kg).

In conclusion, average live body weight and carcass weight was considerable higher in male as compared to female of Baluchi sheep, respectively. Dressing percentage and boneless weight was equally higher in both male and female of Baluchi. Sex-wise data indicated that male animals was superior in terms of live body weight, carcass weight, dressing percentage and boneless weight compared to female animals Baluchi sheep breeds of Balochistan.

Table-1 Comparison of carcass traits between male and female of Baluchi sheep

Traits	Baluchi sheep	
	Male	Female
Live body weight (kg)	30.18	27.56
	±	±
	1.30	0.34
Carcass Weight (kg)	13.25	11.62
	±	±
	0.99	0.44
Dressing ( % )	44.20	42.86
	±	±
	1.55	0.50
Boneless weight (kg)	3.66	3.12
	±	±
	0.27	0.48

### Correlation analysis of male and female Baluchi sheep

#### L live body weight vs carcass weight, dressing (%) and boneless weight

Correlation estimates between male and female of Balochi sheep for live body weight vs carcass weight was  $r = 0.955$  and  $r = 0.638$ , live body weight vs dressing (%)  $r = 0.799$  and  $0.374$  and live body weight vs boneless weight (kg)  $r = 0.873$  and  $0.588$ . This indicates increase in live body weight simultaneously increases carcass weight, dressing percentage and boneless weight increased in both male and female Baluchi sheep breeds maintained at dairy farms of Notal District Nasirabad, Balochistan. The details are given in Table-2.

#### Carcass weight vs dressing (%) and boneless weight

Correlation estimates of male Baluchi and Bibrik for carcass weight vs dressing percentage was observed as  $r = 0.940$  and  $r = 0.692$ , carcass weight t vs boneless weight (kg)  $r = 0.831$  and  $0.603$ . This shows that there was highly positive interrelationship between carcass weight vs dressing percentage, boneless weight in both male and female Baluchi sheep breeds. The details are given in Table-2.

#### Dressing (%) vs boneless weight

Correlation estimates among Baluchi and Bibrik male for dressing percentage vs boneless weight was  $r = 0.690$  and  $r = 0.498$ . This shows that there was strong relationship of dressing percentage with boneless weight, as dressing percentage decreases, boneless weight increases in linear trend in Baluchi male sheep. The details are given in Table-2.

Table-2 Correlation among carcass traits of Baluchi male and female sheep breed.

Traits	Baluchi male sheep				Baluchi female sheep			
	Live body weight	Carcass weight	Dressing (%)	Boneless weight (kg)	Live body weight	Carcass weight	Dressing (%)	Boneless weight (kg)
Live body weight (kg)	1				1			
Carcass weight (kg)	0.955	1			0.638	1		
Dressing (%)	0.799	0.940	1		0.374	0.692	1	
Boneless weight (kg)	0.873	0.831	0.690	1	0.588	0.603	0.498	1

### Regression analysis of male and female Baluchi sheep

Live body weight vs carcass weight, dressing (%) and boneless weight

Regression estimates of male and female Baluchi sheep for live body weight vs carcass weight was ( $r = 0.91$  and  $r = 0.40$ ), live body weight vs dressing (%) ( $r = 0.64$  and  $0.38$ ) and live body weight vs boneless weight ( $r = 0.71$  and  $r = 0.35$ ). This indicates that as live body weight per unit amplified certainly carcass weight, dressing percentage and boneless weight enhanced in Baluchi and Bibrik male sheep breeds (Table-4).

### Carcass weight vs dressing (%) and boneless weight

Regression estimates of male Baluchi and Bibrik for carcass weight vs dressing percentage was found to be ( $r = 0.76$  and  $r = 0.64$ ), carcass weight vs boneless weight ( $r = 0.75$  and  $0.30$ ). There was linear association of carcass weight vs dressing percentage, boneless weight in Baluchi male and female sheep (Table-4).

### Dressing (%) vs boneless weight

Regression estimates of male and female Baluchi for dressing percentage vs boneless weight was found to be ( $r = 0.48$  and  $r = 0.24$ ). Data reported that there was strong relation of dressing percentage with boneless weight in reverse direction, as dressing percentage decreases the boneless weight linearly increases in Baluchi male and female sheep (Table-4).

Table-3 Regression between carcass traits of male Baluchi and Bibrik male sheep

Traits	Baluchi male sheep				Baluchi female sheep			
	Live body weight	Carcass weight	Dressing (%)	Boneless weight (kg)	Live body weight	Carcass weight	Dressing (%)	Boneless weight (kg)
Live body weight (kg)								
Carcass weight (kg)	0.91				0.40			
Dressing (%)	0.64	0.76			0.38	0.64		
Boneless weight (kg)	0.71	0.75	0.48		0.35	0.30	0.24	

## DISCUSSION

It is critical to know the factors that influence the carcass traits of Sheep and goats. Various authors have reported that age, sex (Horcada *et al.*, 1998, Vergara *et al.*, 1999, Barone *et al.*, 2007), breed (Crouse *et al.*, 1981, Hopkins and Fogarty, 1998, Kremer *et al.*, 2004), the kind of food (Hopkins *et al.*, 1995, Jacques *et al.*, 2011) can influence the attributes of the carcass. The results of present study are discussed below.

### Live body weight (kg)

The overall live body weight of Baluchi sheep breed was observed  $30.18 \pm 1.30$  kg in male and  $27.56 \pm 0.34$  kg in female animals of Baluchi sheep breeds. The described results are lower as compared to other researchers Lashari and Tasawar (2013) Mushtaq *et al.*, (2010) Achakzai *et al.*, (2005) Juma *et al.*, (1998) Garcia *et al.*, (1980) reported that variation in the live body weight might be due to the breed, sex, environmental, genetic variation and feeding regimes. Same statement also repeated by Agnihotri and Rajkumar (2001) Mattos *et al.*, (2006) reported that age, sex and feeding regimes are important factors in difference of live body weight. The findings of current study partially supported by Morris *et al.*, (2000) Cloete *et al.*, (2001) where they reported the live body weight of 32.23 in male and 29.47 female sheep breed. The results of study were lower than the findings of Zapasnikiene (2002) Berhan and Arendonk (2006) they stated that not all breeds of sheep have potential for high daily weight gains, therefore, the crossbreeding is the most effective way to improve the production of lamb meat, because it directly effects on the body weight of sheep. The results of current study were found higher than the results of Petrovic *et al.*, (2009) Leymaster *et al.*, (2002) 27.21 in male and 25 in female of Chlite sheep. The reported difference among live body weight of male

and female sheep breed between the studies may be due to breed variation, and favorable environmental conditions with good availability of the fodder on the farm.

### **Carcass weight (kg)**

The overall carcass weight was observed  $13.25 \pm 0.99$  kg in Balochi male sheep and  $11.62 \pm 0.44$  kg in Balochi sheep female whereas overall carcass weight was observed  $12.18 \pm 0.62$  kg. The results of current study were found lower than Joy *et al.*, (2008) Leymaster *et al.*, (2002) 23.45 and 21.15 kg in Namibian sheep and 21.18 and 18.87 in Angora sheep. The difference among carcass weight might be due to feed intake of animal between the breeds also may be due to genetic potential of different breed as well as different feeding programs during growth and fattening period of animals. The similar findings reported by Priolo *et al.*, (2002) Jacques *et al.*, (2011) observations recorded on Churra and Tensina sheep breed 22.19 and 21.67 that might be due to different feeding program and grazing of animals on yield pastures. The result of current study are supported by Zapasnikiene (2002) Berhan and Arendonk (2006) studied the factors affecting variation in birth weight is especially important, given the relationship of birth weight to neonatal and adult health. Our study also partially supported by the Lashari and Tasawar (2013) Mushtaq *et al.*, (2010) reported carcass weight 14.78 to 11.53 and 13.52 to 12.97. The findings of Macfarlane *et al.*, (2004) Kashan *et al.*, (2005) Ekiz *et al.*, (2009) were higher than the current study, who reported 15.17 to 14.11 kg and 17.53 to 15.43 kg in Brongus and Bali sheep breed. The findings of Rodrigues *et al.*, (2006) supported the study, who reported 14.03 to 11.93 kg in Texa sheep breed. The difference among carcass weight of current study might be due to breed difference, productive purposes and characteristics of meat breeds of sheep.

In our study difference in carcass weight of both sheep breed may also due to genetic makeup of breeds. Furthermore, the difference carcass weight of both breed may also be associated with different management and environmental changes. It is real fact that carcass yield can be increased by improving the feeding management practices and other environmental conditions, instead of having whole emphasis on exploring the genetic potential of animals.

### **Dressing percentage**

The overall dressing percentage was found  $44.20 \pm 1.55$  kg in Balochi sheep male and  $42.86 \pm 0.50$  kg in Balochi female sheep breed. whereas  $42.86 \pm 0.50$  kg. The findings of current study are lower than the findings of Pour *et al.*, (1998) Nori and Mansour, (1992), who reported dressing percentage of Hampshire sheep breed and Suffolk sheep breed 49.13 to 45.93 kg 47.56 to 44.13 kg, author reported that dressing percentage affected by live body weight and carcass weight of animal such as live weight and carcass increased the dressing percentage also increased and live weight and carcass weight decreased dressing percentage will also decreased that may be due to breed difference, Gibb *et al.*, (2015). Same statement repeated by Sherton *et al.*, (1993), who reported that increased in live body weight and carcass weight positively related with dressing percentage. The findings of current study are lower than the findings of Filho *et al.*, (2008) who reported 51.73 to 49.12 kg of dressing percentage in Brangus sheep breed. The difference among studies might be due to influence of age, live body weight, sex and body condition of slaughtered animals. The same statement repeated by Geenwod *et al.*, (2006), who stated that the dressing percentage of slaughter sheep may be influenced by age, sex and body condition of animal. The findings of current study supported by Zeidan *et al.*, (1984) Houria and Omar (1994) Khalil and Eid (2004), who reported 44.95 to 41.67, 45.01 to 42.53, 44.13 to 42.15 kg of dressing percentage. The results of current study are also partially supported by the results of Piedrafita *et al.*, (2003), who reported 45.75 to 42.45 kg in Nijdi sheep breed. The interactions among the individual factors affecting dressing percentage are great, making it rather difficult to accurately predict carcass yield or quality by visual examination of the live sheep animal Gibb *et al.*, (2015).

### **Boneless weight (kg)**

The overall boneless weight was observed in Balochi male sheep  $3.66 \pm 0.27$  kg and  $3.12 \pm 0.48$  kg in female Balochi sheep breed whereas  $3.18 \pm 0.29$  kg. The findings of our study are lower than the findings of Lashari and Tasawar (2013) Mushtaq and Tasawar (2010) Achakzai *et al.*, (2005), who reported 7.63 to 5.91 kg 6.97 to 5.21 kg 8.13 to 7.75 kg of boneless weight in different sheep breeds. The difference among studies may be associated with long-legged animals or shorter leg animals as well as smaller or elongated animals which can be found a higher plane of nutrition also typically results in a higher boneless weight Juma *et al.*, (1998). Same statement repeated by Garcia *et al.*, (1980), who reported that animals having long legs have higher boneless weight and animal having smaller leg size are relatively found lower boneless weight which is also associated breed and genetic makeup of individual animal of individual sheep breed. The findings of current study partially supported by results of Agnihotri and Rajkumar (2001) Bruce *et al.*, (2010), who reported 4.01 to 3.63 kg boneless in Jacob and patora sheep breeds.

### **Correlation and regression estimates of carcass traits**

In current study the correlation and regression estimates of carcass traits were found positive among various carcass traits of Balochi male female sheep breed. The positive results of current study indicated strong relation among various carcass traits of male and female sheep breed. The correlation estimates for live body weight vs carcass weight, dressing percentage, boneless weight, carcass weight vs dressing percentage, boneless weight, dressing percentage vs boneless weight in Baluchi male sheep were observed positive 0.955, 0.799, 0.873, 0.940, 0.831, whereas in for female of Baluchi sheep breed were found positive 0.638, 0.374, 0.588, 0.692, 0.603, and 0.498, respectively. The findings of current study are supported by Mattos *et al.*, (2006) Filho *et al.*, (2008) Mushtaq and Tasawar (2010) Achakzai *et al.* (2005) Juma *et al.*, (1998) Garcia *et al.*, (1980), reported positive and strong correlation estimates among difference carcass traits of sheep breeds. Similar results were described by Agnihotri and Rajkumar (2001) Bruce *et al.*, (2010) Lashari and Tasawar (2013), who also reported positive correlation among carcass weight, dressing percentage and boneless weight among difference sheep breeds.

The positive results of regression estimates of male Baluchi sheep indicated positive and relatively higher relation among different carcass traits of both male and female sheep breed. The regression estimates for live body weight vs carcass weight, dressing percentage, boneless weight, carcass weight vs dressing percentage, boneless weight, dressing percentage vs boneless weight for Balochi male sheep were found positive 0.99, 0.64, 0.76, 0.71, 0.75, and 0.48, whereas for female of Baluchi sheep breed it was found positive 0.40, 0.38, 0.35, 0.64, 0.30, and 0.21, respectively. The findings of our study supported by results of Azahan and Noraziah (2001) Mckiernan *et al.*, (2007) Zeidan *et al.*, (1984) Houria and Omar (1994) Khalil and Eid (2004), who reported strong and positive regression values among different carcass traits dressing percentage boneless weight live body weight. The findings of current study are also supported by the findings of Izadifard and Dadpasand (2007) Nicoll *et al.*, (1998) Makarechian *et al.*, (1977) Hassan and El-Feel (1991), who also reported positive and strong regression values for live body weight, carcass weight, dressing percentage and boneless weight, they also stated that increase in live body weight also increased in other carcass weight positively.

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