Int. j. adv. multidisc. res. stud. 2026; 6(3):2051-2057

Received: 07-05-2026
Accepted: 17-06-2026

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Slaughter Performance and Proportion of Individual By-Products in Donkeys

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Abstract

The domestication of the wild African (Nubian) donkey is believed to have begun approximately 8,000–11,000 years ago. This process gradually spread from North Africa toward the regions of Southeast Asia and parts of Southern Europe (Trailović *et al*., 2021) [8].

The donkey is a typical working animal. Its biostatic model is specifically adapted to enable prolonged locomotion and endurance (Urošević *et al*., 2022) [11]. Today, particularly in Western and Central Europe, the role of the donkey has changed significantly.

The observed parameters were collected during the commercial slaughter of 12 male donkeys in an appropriately equipped industrial slaughter facility. The age of the donkeys ranged from 1.5 to 3.0 years. All donkeys in this group belonged to the same type and were of approximately the same age. In addition to these 12 male donkeys, one further male donkey was slaughtered that differed markedly from the previous group in its exterior characteristics (height at the withers, chest girth, and body mass).

Based on all recorded parameters and the mathematical analyses performed, it can be concluded that pre-slaughter body mass is the most reliable predictor of bone mass, meat mass, and raw hide mass in donkeys. With regard to height at the withers, it does not have primary importance in influencing bone mass, meat mass, or hide mass. Chest girth is not a reliable indicator because of its considerable variability, and the influence of this morphometric parameter on bone mass, meat mass, and fresh hide mass is almost negligible.

Keywords: Donkeys, Body Mass, By-Products, Meat

Introduction

The domestic donkey (Equus asinus asinus L., 1748) belongs to the group of the oldest domesticated animal species. It is believed that the domestication of the wild African (Nubian) donkey began approximately 8,000–11,000 years ago. This process gradually spread from North Africa toward the regions of Southeast Asia and parts of Southern Europe (Trailović *et al*., 2021) [8].

Donkeys reached Europe through two main routes. The first route led through Asia Minor to the Balkan Peninsula. After adapting to the environmental conditions of the Balkans, they gradually spread westward and eventually reached Italy, where they became, and still remain, highly popular and appreciated animals. They later expanded into other parts of Europe during the territorial expansion of the Roman Empire.

A second probable route of introduction into Europe was from North Africa across the Strait of Gibraltar into Spain. From there, donkeys spread relatively easily into neighboring countries. Over time, numerous phenotypically distinct types and

breeds were developed in different geographical environments (Urošević, 2022) [9].

From the very beginning, the donkey was primarily a working animal. By studying mechanical lesions of the joints and, above all, the vertebral column, Rossel *et al*. (2008) [7] identified characteristic changes associated with load-carrying animals in the skeletons of ten donkeys. The skeletal remains, approximately 5,000 years old, were discovered in the royal funerary complex of Abydos in Upper Egypt. Degenerative changes were observed in the joints and vertebrae, while certain alterations were also recorded in the metacarpal bones.

The donkey is a typical working animal. Its biostatic conformation is particularly adapted to sustained locomotion and endurance (Urošević *et al*., 2022) [11]. Today, especially in Western and Central Europe, the role of the donkey has changed considerably. The need for its use in transportation has virtually disappeared. Breeders in these regions have increasingly focused on the production of milk and dairy products, whereas the production of meat and meat products is practiced on a much smaller scale. An important exception is Italy, where the production of donkey meat and processed donkey meat products remains a traditionally developed sector.

Fig 1: Donkey meat salami. (Foto. M.Urošević)

Polidori and Vincenzetti (2017) [5] reported that the global donkey population is approximately 44 million animals. About one-half of this population is found in Asia, slightly more than one-quarter in Africa, while the remaining animals are distributed mainly throughout Latin America.

In Europe, the donkey population is estimated to range between 100,000 and 130,000 animals. The exact number varies depending on whether only European Union member states or all European countries are included in the assessment (Masebo *et al*., 2025) [4].

The consumption of donkey meat has no significant tradition in Serbia, and this meat is not considered among the most preferred types of meat. Nevertheless, a limited number of animals are slaughtered annually at the local level.

With regard to quantitative slaughter parameters in donkeys, such as the proportion of individual body components relative to pre-slaughter live body mass and hot carcass mass, the available scientific literature remains relatively limited.

Polidori *et al*. (2008) reported that in donkeys aged between 15 months and 7 years, the dressing percentage ranged from 53.3% to 54.5%. Information on donkey dressing percentage in Africa was provided by Aganga *et al*. (2003) [1], who reported values reaching 59.5%. However, this value was recorded only in a small number of adult animals that were in good body condition.

Investigating the length of different sections of the digestive tract, excluding the esophagus, Urošević *et al*. (2025) [10] found, in a sample of nine slaughtered donkeys, that the total digestive tract length was highly variable, ranging from 10.63 m to 17.42 m, representing a difference of 6.79 m. Interestingly, the donkey with the longest intestines was only 10.8 cm taller than the animal with the shortest intestines. Such variability in digestive tract length may substantially influence both live body mass and carcass mass.

Ivanković *et al*. (2023) reported that the average dressing percentage of Croatian donkey breeds was 50.25% in the Istrian donkey and 49.52% in the Littoral-Dinaric donkey. The average pre-slaughter body mass of Istrian donkeys was 177.20 kg, compared with 115.10 kg in Littoral-Dinaric donkeys.

Comparing meat quality and dressing percentage between mules and donkeys, Polidori *et al*. (2020) [6] found that the average dressing percentage of donkeys was 53.7%. The study was conducted on ten donkeys obtained by crossing two Italian donkey breeds, Martina Franca and Ragusana. The average pre-slaughter body mass of the donkeys was 285 kg. Compared with donkeys, mules exhibited a higher dressing percentage, averaging 58.4%.

While studying dressing percentage and the contribution of slaughter by-products to body mass, Hernández-Briano *et al*. (2018) [2] evaluated 106 male and 83 female donkeys originating from crosses between local breeds and the Catalan donkey. The average hot carcass mass was 73.4 kg in males and 63.7 kg in females. The hot carcass dressing percentage was 46.6% in males and 45.6% in females. In male animals, head mass represented 5.3% of hot carcass mass, whereas skin mass accounted for 8.3%.

Materials and Methods

The investigated parameters were collected during commercial slaughter in a licensed industrial slaughter facility. A total of 12 male donkeys were included in the main study group. The animals ranged in age from 1.5 to 3.0 years. All donkeys in this group belonged to the same type and were of similar age.

In addition to these 12 male donkeys, one additional male donkey was slaughtered. Based on its exterior characteristics (withers height, chest girth, and body mass), this animal differed markedly from the main group. Since only one individual exhibited such distinct characteristics, its data are presented separately in order to preserve the homogeneity of the group consisting of 12 animals. Furthermore, only one female donkey was slaughtered, and her data are also presented separately.

These animals were not part of any experimental trial and were not slaughtered for the purpose of collecting the data presented in this study.

Prior to slaughter, withers height, chest girth, and live body mass were determined. Withers height was measured using a Litinov measuring stick, whereas chest girth was measured with a livestock measuring tape. Body mass was determined using a digital scale incorporated into the slaughterhouse weighing system.

On the day of slaughter, the donkeys were not provided with

feed but had free access to water. It should be emphasized that these animals had been removed from the herd as a result of selective culling and were neither specifically reared nor fattened for slaughter.

Following stunning and exsanguination, evisceration was performed, after which the skin was removed. The mass of the hot carcass, without the head, was then recorded. Head mass and hot skin mass were also determined. After hot carcass deboning, the masses of meat and bones were measured.

Fig 2: Digestive tract immediately before evisceration (Foto: M.Urošević)

Results

The morphometric parameters are presented in Table 1.

Table 1: Withers Height and Chest Girth

Number	WH (cm)	ChG (cm)
1	98,7	144
2	105,9	110
3	93,8	91
4	95,0	105
5	92,4	94
6	96,5	94
7	95,9	96
8	99,9	97
9	98,3	99
10	99,2	99
11	87,3	90
12	89,1	92
Average	96,0	100,92
Variation interval	87,3-105,9	91-144

WH – Withers Height; ChG – Chest Girth

Based on the data presented in Table 1, it can be concluded that the group of 12 donkeys was relatively homogeneous with respect to withers height. In contrast, chest girth values exhibited a considerably wider range of variation. Interestingly, the maximum chest girth value (144.0 cm) was not recorded in the tallest animal, whose withers height was 105.8 cm. The smallest chest girth value (90.0 cm) was observed in the shortest individual, which had a withers height of 87.3 cm.

It is well known that products derived from donkey meat are generally more expensive than those obtained from other domestic livestock species. This becomes more understandable when the obtained results are examined. Table 2 presents a comparative overview of body mass, carcass mass, head mass, meat mass, skin mass, and bone mass.

Table 2: Comparative Presentation of the Investigated Parameters

Number	BW (kg)	Carcass (kg)	Meat (kg)	Head (kg)	Skin (kg)	Bones (kg)
1	70	37,60	15,60	5,435	7,40	22,00
2	90	49,00	23,40	4,760	10,0	25,60
3	61	33,60	12,00	6,215	7,40	21,60
4	89	47,80	24,00	5,340	11,0	23,80
5	61	32,40	13,20	4,730	8,40	19,20
6	74	41,40	19,60	5,140	9,60	21,80
7	73	41,00	19,40	5,130	9,80	21,60
8	89	51,40	27,00	5,080	11,50	24,40
9	78	45,40	21,80	5,240	10,60	23,60
10	89	47,70	21,00	6,080	10,40	26,40
11	63	35,00	15,20	4,650	8,40	19,80
12	60	34,60	14,40	4,420	8,60	20,20
Average	74,25	41,41	18,88	5,185	9,425	22,50
Variation interval	61-90	32,40-51,40	12,00-27,00	4,420-6,080	7,40-11,50	19,20-26,40

BW - Body weight before slaughter

Interestingly, the donkey with the greatest live body mass (90.00 kg) did not exhibit the highest carcass mass. Within the observed group, two animals had a carcass mass of 61.00 kg, which represented the minimum value recorded. These two individuals also showed similar dressing percentages, amounting to 32.40% and 33.60%, respectively.

The dressing percentage is defined as the percentage ratio between carcass mass and the live body mass of the animal immediately prior to slaughter (Vuković, 1992) [12].

The dressing percentage values obtained in this study are presented in the following table.

Table 3: Dressing Percentage of Male Donkeys

Number	Mass before slaughter (kg)	Carcass (kg)	DP (%)
1	70	37,60	53,71
2	90	49,00	54,44
3	61	33,60	55,08
4	89	47,80	53,71
5	61	32,40	53,11
6	74	41,40	55,94
7	73	41,00	56,16
8	89	51,40	57,75
9	78	45,40	58,21
10	89	47,70	53,59
11	63	35,00	55,55
12	60	34,60	57,67
Average	74,25	41,41	55,41
Variation interval	61-90	32,40-51,40	53,11-58,21

DP – Dressing Percentage

Within the studied group, two animals had a live body mass of 61.00 kg, which represented the minimum value

recorded, and they exhibited similar dressing percentages of 53.40% and 53.60%, respectively. The greatest withers height recorded was 105.90 cm; however, this donkey did not achieve the highest dressing percentage.

Among the 12 male donkeys examined, the lowest dressing percentage was 53.11%, while the highest reached 58.21%. It was evident that dressing percentage did not increase linearly with increasing pre-slaughter live body mass. The animal with the lowest live body mass (61.00 kg) exhibited a dressing percentage of 55.08%, whereas the donkey with the highest live body mass (90.00 kg) had a dressing percentage of 54.55%.

It is noteworthy that the donkey with the lowest withers height (87.30 cm) had a dressing percentage of 55.55%, which was not the lowest value observed. Conversely, the tallest donkey in the group, with a withers height of 105.90 cm, had a dressing percentage of 54.44%.

These findings indicate that the amount of meat present on the body does not increase linearly with increasing body frame size. As body dimensions increase, bone mass and skin mass also increase, while the mass of the digestive tract remains highly variable.

Table 4: Proportion of Meat Relative to Live Body Mass of Donkeys

Number	LBM (kg)	Mass of meat (kg)	Mass of meat (%)
1	70	15,60	22,28
2	90	23,40	26,00
3	61	12,00	19,67
4	89	24,00	26,97
5	61	13,20	21,64
6	74	19,60	26,50
7	73	19,40	26,57
8	89	27,00	30,34
9	78	21,80	27,85
10	89	21,00	23,59
11	63	15,20	24,13
12	60	14,40	24,00
Average	87,61	18,88	25,67
Variation interval	60-90	12,00-27,00	19,67-30,34

LBM – Live Body Mass

The results presented in Table 4 clearly demonstrate and confirm why donkey meat is relatively expensive. The range of variation in meat yield relative to pre-slaughter live body mass was considerable, with an average value of only 25.67%. It can reasonably be assumed that somewhat higher values might have been achieved if the animals had been specifically prepared and fed for slaughter. However, as previously noted, the donkeys included in this study had been selected for culling and removed from the herd as less desirable animals rather than being raised for meat production.

The highest meat yield (30.34% of live body mass) was obtained from an animal that also had the greatest pre-slaughter live body mass (89 kg). Interestingly, another donkey with the same pre-slaughter body mass (89 kg) produced a substantially lower meat yield, amounting to 23.59% of live body mass.

Pearson's correlation analysis revealed a very strong association between live body mass and meat mass. Withers height also showed a statistically significant relationship with meat mass. In contrast, chest girth did not exhibit a statistically significant effect on meat mass, although it demonstrated a positive trend toward significance ($p = 0.056$). The results of the correlation analysis are presented in the following table.

Table 5: Correlation of Meat Mass with Exterior Characteristics and Live Body Mass

Parameter	r	p
Withers Height	0,653	0,021
Chest Girth	0,565	0,056
Live Body Mass	0,871	0,00022

When multiple regression is performed for meat mass, it is obtained that $R2=0.807$. This indicates that with this analysis, 80.7% of the variability of the obtained meat mass can be detected.

The contribution and statistical significance of the individual predictors included in the regression model are presented in the following table.

Table 6: Significance of Individual Factors Included in the Regression Model

Parameter	p
Withers Height	0,620
Chest Girth	0,168
Live Body Mass	0,006

Based on this, it can be concluded that the body mass of the animal before slaughter is the only statistically significant factor for the obtained meat mass. In contrast to it, the height of the withers and the circumference of the chest do not have independent importance in influencing the meat mass, and this is a consequence of the mutual connection of the parameters.

Table 7: Meat content in warm carcass weight

Number	Carcass (kg)	Mass of meat (kg)	Mass of meat (%)
1	37,60	15,60	41,49
2	49,00	23,40	47,75
3	33,60	12,00	35,71
4	47,80	24,00	50,21
5	32,40	13,20	40,74
6	41,40	19,60	47,34
7	41,00	19,40	47,32
8	51,40	27,00	53,53
9	45,40	21,80	48,02
10	47,40	21,00	44,30
11	35,00	15,20	43,43
12	34,60	14,40	41,62
Average	41,41	18,88	45,04
Variation interval	32,40-51,40	12,00-27,00	35,71-53,53

When looking at the proportion of meat in the mass of the warm carcass, the average absolute value is 45.04% with a wide variation interval, from 35.71% to 52.53%. The maximum value of meat mass was obtained in the same donkey as in the ratio of meat to live weight before slaughter. The same situation applies to the minimum value. The same donkey, which had the smallest percentage of meat in the mass before slaughter, also has the smallest mass of meat in relation to the mass of the warm carcass.

Table 8: Ratio of head mass to live body mass

Number	LBM (kg)	Head (kg)	Head (%)
1	70,00	5,435	7,76
2	90,00	4,760	5,29
3	61,00	6,215	10,19
4	89,00	5,340	6,00
5	61,00	4,730	7,75
6	74,00	5,140	6,94
7	73,00	5,130	7,03
8	89,00	5,080	5,71
9	78,00	5,240	6,72
10	89,00	6,080	6,83
11	63,00	4,650	7,38
12	60,00	4,420	7,37
Average	74,25	5,185	7,08
Variation interval	60,00-90,00	4,420-6,215	5,71-10,19

LBM – Live Body Mass

It is common knowledge that a donkey has a large head, and these studies show that it also has a heavy head. In relation to the average mass of the body before slaughter, the average mass of the head is 7.08% with a fairly wide variation interval where the maximum value reaches 10.19% of the mass of the body before slaughter. It is very interesting that the mass of the head does not stand in a linear relationship with the mass of the body before slaughter. The largest head mass (6.215 kg) was determined in an individual that did not have the largest body mass before slaughter, but only slightly above the minimum value (61.00 kg).

The reason why the donkey has a big and heavy head lies in the biostatic model. A large and heavy head, along with a properly, low, set neck in the body allow the body's center of gravity to move forward. In this way, the back, motor part of the body is partially freed from the burden of the body mass and has the possibility to produce a larger amount of biokinetic energy, which, pushing the body forward, causes a biokinematic effect that we call movement. This is not specific only to domestic donkeys, the same situation applies to wild donkeys.

Correlation analysis of the relationship between withers height, chest girth and body weight before slaughter on head weight shows that none of the mentioned factors has a statistically significant effect on head weight.

Table 9: Importance of individual factors in the model

Parameter	p
Withers Height	0,669
Chest Girth	0,725
Live Body Mass	0,282

This confirms that the biostatic model is defined according to the same principle regardless of the size of the donkey. This is logical since the biostatic model was formulated by natural selection and allows all donkeys to perform work in different climatic and relief conditions, regardless of body size.

Table 10: Correlation analysis of the influence of exterior parameters and body mass on head mass

Parameter	r	p
Withers Height	0,186	0,563
Chest Girth	0,112	0,729
Live Body Mass	0,329	0,296

In multiple regression for head mass, R2=0.184 is obtained. This once again confirms the low level of influence of the mentioned factors (18.4%).

Table 11: The ratio of the mass of bones, after bone out and fresh skin to the mass before slaughter

Number	BW (kg)	Bones (kg)	Bones (%)	Fresh skin (kg)	Fresh skin (%)
1	70	22,00	31,43	7,40	10,57
2	90	25,60	28,44	10,00	11,11
3	61	21,60	35,41	7,400	12,13
4	89	23,80	26,74	11,00	12,36
5	61	19,20	31,47	8,40	13,77
6	74	21,80	29,46	9,60	12,97
7	73	21,60	29,58	9,80	13,42
8	89	24,40	27,41	11,50	12,92
9	78	23,60	30,25	10,60	13,59
10	89	26,40	29,66	10,40	11,68
11	63	19,80	31,42	8,40	13,33
12	60	20,20	33,66	8,60	14,33
Average	74,25	24,37	30,41	9,45	12,61
Variation interval	60,00-90,00	19,20-26,40	26,74-35,41	7,40-11,50	10,57-13,77

BW - Body weight before slaughter

The results in the previous table give a fairly clear answer as to why the efficiency of slaughtering donkeys is relatively low. The average bone mass (30.41%) is slightly higher than a third of the total body mass before slaughter.

Correlation analysis of the influence of exterior parameters and body mass on bone mass revealed that there is a high statistical significance between the height of the withers and bone mass. When it comes to chest circumference, this exterior parameter has no statistically significant influence, and body mass has a very high statistical significance in influencing bone mass.

Table 12: Correlation analysis of the influence of exterior parameters and body mass on bone mass

Parameter	r	p
Withers Height	0,809	0,0015
Chest Girth	0,207	0,519
Live Body Mass	0,884	0,00014

Multiple linear regression, for bone mass, gives R2=0.828. This value indicates that, in 82.8% of cases, the previously mentioned three parameters explain the variability of bone mass.

Table 13: Importance of individual factors in the model

Parameter	p
Withers Height	0,179
Chest Girth	0,586
Live Body Mass	0,035

In the common model, ridge height has no statistically significant effect on bone mass, and the same applies to chest circumference. However, body mass has a statistically significant effect on bone mass.

In the live mass of individuals, a significant part of waste is skin. In a sample of 12 male animals, whose average calf weight was 74.25 kg, the average weight of fresh skin was 9.45 kg, or 12.61% of the weight of the live animal. While leather is still a highly sought after and desirable product in Asia and Africa, this is not the case in Europe.

Correlation analysis (Pearson) found that body mass has a high statistical significance of influence on the mass of raw skin, while withers height has a statistical significance of influence on the mass of raw skin. Chest circumference, in this study, did not show a statistically significant effect on raw skin mass.

Table 14: Correlation analysis of the influence of exterior parameters and body mass on fresh skin mass

Parameter	r	p
Withers Height	0,713	0,009
Chest Girth	0,507	0,092
Live Body Mass	0,932	<0,0001

Using multiple linear regression, the coefficient of determination R2=0.901 is obtained. Based on this, it can be concluded that this mathematical model provides an explanation for 90.1% of the variability of fresh skin mass.

Table 15: Importance of individual factors in the model

Parameter	p
Withers Height	0,482
Chest Girth	0,262
Live Body Mass	0,001

Overall, body weight before slaughter is the only one with a statistically significant influence on the weight of fresh skin. When it comes to the influence of the height of the withers and the girth of the chest, their independent, separate influence is lost due to the mutual connection with the body mass.

Female

The height of the withers of the female individual was 104.7 cm, and the chest circumference was 113 cm. The mass of the hull was 46.4 kg. The mass of the bones was 23.4 kg, which is 50.43% of the mass of the warm carcass. In relation to the mass before slaughter, the mass of bones represents 21.47%. After boning, 23 kg of meat were obtained. The slaughter yield, warm carcass, of this female was 42.57%.

The weight of the head was 6.10 kg or 5.59% of the live weight before slaughter. The weight of the fresh skin was 11.00 kg, which is 10.09% of the live weight. In this individual, the bone mass is almost equal to the meat mass. The bone mass was 23.4 kg, which is 21.47% of the live mass and 50.43% of the carcass.

Tall donkey

The male with a height of 124.5 cm and a body weight of 242 kg is completely out of a homogeneous group of 12 males. Chest circumference was 140 cm. The mass of the warm body was 113.4 kg. From such a warm carcass, 83 kg of meat was obtained, and the bone mass was 30.4 kg. Based on these data, the proportion of meat in relation to live weight is 34.29%. The yield of hot meat is 46.86%.

Bone mass in relation to carcass mass is 26.81%, and in relation to live mass 12.56%. It is interesting that the mass of the head of this big donkey does not deviate much from the mass of heads in the observed group of donkeys. The weight of the head was 10.7 kg, which is 4.42% of the live weight before slaughter and 9.44% of the carcass weight.

When it comes to the mass of the warm skin, its mass was 24 kg. This represents 9.92% of living mass.

Conclusion

Based on all determined parameters and performed mathematical analyses, it can be concluded that the body mass before slaughtering donkeys is the most reliable indicator of bone mass, meat mass and raw hide mass. When it comes to the height of the withers, it has no primary importance in influencing bone mass, meat mass and skin mass. Chest circumference is not a reliable indicator, due to considerable variability, and the influence of this morphometric parameter on bone mass, meat mass and fresh skin mass is almost imperceptible.

The mass of the head is not influenced by the previously mentioned factors.

When it comes to the female individual, the obtained slaughter efficiency value is 42.57%. This value is significantly lower than the average value of slaughter efficiency in a group of 12 donkeys (55.41%). It is interesting that in the case of a big donkey, the slaughter efficiency value is 46.86%. And this value is lower than the average value of the slaughter efficiency of the group.

Bone mass, in relation to live mass, in a group of 12 donkeys represented, on average, 30.41% of live mass. In a female, that value is 21.47%, and in relation to the mass of the carcass, it is 50.43%. These values must be taken as informational only, no general conclusions can be drawn from them as the female was in extremely poor condition.

When it comes to the weight of the head, without the skin, it was 6.10 kg, which was 5.59% of the live weight. Regardless of the extremely poor body condition and significantly lower values of other parameters, compared to the group of 12 donkeys, the head mass was not proportionally that much smaller. In the group, the head mass was on average 7.08% of the live mass, which is only 1.27% more than the head mass of the female.

That nature protects the body regardless of physical condition is also confirmed by the mass of fresh skin. The average value in the group of 12 male donkeys was 9.425 kg, which was 12.61% of live weight. In this female, the mass of raw skin was 11.00 kg, which represents 10.09% of live weight.

In the case of a big donkey, the value of slaughter randman is 46.86%, which is less than the average value (55.41%) in a group of 12 donkeys. The amount of meat obtained was also lower (34.29%) compared to live weight.

The mass of bones, in a big donkey, represented 12.56% of live mass and 26.81% of carcass mass. The average value, in relation to live weight, in the group, was 30.41%. Despite the fact that the height of the withers is significantly higher than the average, and also the highest, value in the group of 12 individuals, the mass of the head (10.7 kg) of the big donkey is almost twice as high in absolute value, but in relative terms it is 4.42% of live body mass. It is less than the average value for the relative value of the ratio of head to live mass (7.08%) in the observed group. The raw hide had a mass of 24 kg, which is 9.92% of the live weight, thus less than the average value (12.615) of the group of male donkeys.

Unlike the female, this donkey was in good physical condition.

Despite the fact that the research was carried out on a relatively small sample, and donkeys were eliminated from the herd for the purpose of selection, the obtained results clearly indicate that the by products of slaughter, primarily

skin and head, make up 19.69% of the live weight of the body before slaughter.

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