SLAUGHTER CHARACTERISTICS OF RABBITS BASED ON SEXUAL DIMORPHISM

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ABSTRACT

This study investigated the effect of sexual dimorphism on slaughter performance in rabbits. The results showed that female rabbits had higher live weight (2825.7 g) and slaughter weight (1571.7 g) compared to males (2637.7 g and 1419.3 g, respectively). The most pronounced difference was observed in fat mass, with females exhibiting 2.34 times greater fat mass than males. The findings indicate that sexual dimorphism in rabbits is expressed at both metabolic and morpho-functional levels. It was found that proteogenic processes predominate in males, whereas lipogenic processes predominate in females.

Introduction. Increasing meat productivity and improving the quality of raw materials are among the key priorities in modern rabbit breeding. The Californian rabbit breed is considered one of the most promising meat breeds in Uzbekistan due to its high growth rate and adaptability [7, 8]. However, rabbit breeding is often based on general zootechnical standards, which do not sufficiently account for sex-related biological differences in animal development [2].

Sexual dimorphism in rabbits is most clearly expressed through fundamental metabolic growth pathways—proteogenic (muscle protein synthesis) and lipogenic (fat accumulation) processes [3, 4]. Differences in the hormonal profiles of female and male rabbits, particularly the effects of estrogenic and androgenic hormones, directly influence carcass composition, especially the fat-to-meat ratio [2, 6]. To date, the relationship between hormonal and metabolic profiles and histological characteristics in rabbits remains insufficiently studied. In particular, there is a lack of comprehensive data on the histomorphological structure of muscle tissue, including parameters such as muscle fiber diameter, epimysial thickness, and fiber density, and their influence on slaughter quality [5]. This gap complicates the development of effective breeding strategies aimed at improving meat productivity [1, 9].

In recent years, the demand for healthy lifestyles and dietary foods has increased significantly. White meat, particularly poultry, is valued for its high protein and low fat content. Rabbit meat, which is also classified as white meat, has a chemical composition similar to poultry and is rich in essential amino acids such as lysine and tryptophan [10, 11]. In Uzbekistan, however, studies addressing slaughter and meat quality indicators in relation to sexual dimorphism remain scarce. Therefore, the present study aims to evaluate slaughter performance and meat quality traits in rabbits based on sexual dimorphism.

Materials and Methods. Clinically healthy 3-month-old Californian rabbits were used in this study. The animals were kept under identical feeding and housing conditions. The experimental groups consisted of females (n = 15) and males (n = 15).

Prior to slaughter, the animals were fasted for 12 hours. Slaughter was performed by severing the neck using a knife in accordance with standard procedures. Slaughter weight was determined according to GOST 27747–2016 by weighing the hot carcass using an electronic scale.

After recording slaughter weight, carcass weight and internal fat (located in the scapular, pelvic, and perirenal regions) were measured separately. Based on these data, slaughter yield relative to live weight was calculated.

The primary data were processed using Microsoft Excel 2007 [13]. Descriptive statistical parameters, including the arithmetic mean and its standard error ($\bar{X} \pm Sx$), as well as the coefficient of variation (Cv, %), were calculated. Differences between groups were assessed for statistical significance at $P < 0.05$ and $P < 0.01$.

Results and Discussion. The slaughter weights of 3-month-old Californian rabbits by sex are presented in Table 1.

Table 1

Slaughter Weight Parameters of Rabbits by Sex (g)

Parameters	Sex groups			
	Female		Male	
	$\bar{X}\pm S_x$	C_v %	$\bar{X}\pm S_x$	C_v %
Live weight	2825,7±49,72*	6,82	2637,7±48,42	7,11
Slaughter weight	1571,7±29,61**	7,30	1419,3±27,45	7,49
Carcass weight	1437,0±27,36	7,37	1361,7±26,92	7,66
Fat weight	134,7±2,51***	7,22	57,6±1,45	9,76

Note: *-P<0,05; **-P<0,01; ***-P<0,001

The data presented in Table 1 demonstrate the influence of sex on the slaughter performance of rabbits. Females had a higher pre-slaughter live weight, exceeding that of males by an average of 188 g ($P < 0.05$), or 7.13%.

Females also outperformed males in key slaughter traits. In particular, the slaughter weight of females was 1,571.7 g, compared to 1,419.3 g in males. The difference amounted to 152.4 g ($P < 0.01$), or 10.74%.

Carcass weight was also higher in females by 75.3 g (5.53%); however, this difference was not statistically significant ($P > 0.05$).

A pronounced manifestation of sexual dimorphism was observed in fat deposition. Females exhibited a more developed fat layer, especially in the perirenal region, which was evident even upon visual assessment (Figs. 1–2). Quantitative analysis showed that fat weight

averaged 134.7 g in females and 57.6 g in males, with a difference of 77.1 g (P < 0.001), indicating that females had 2.34 times greater fat accumulation than males.

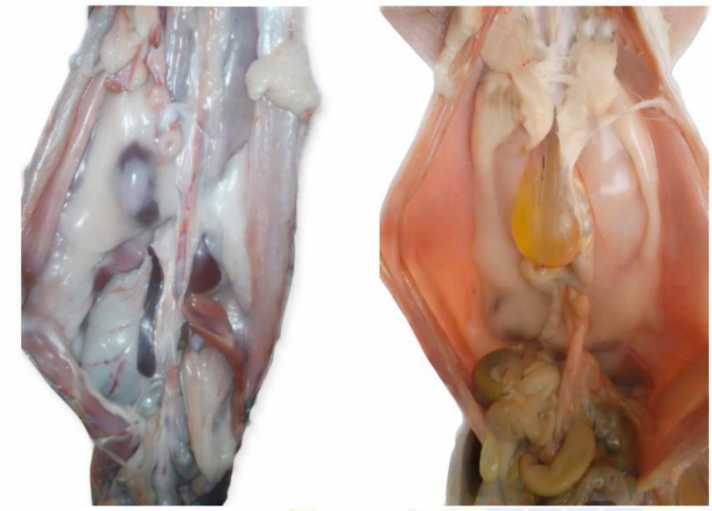

Figure 1. Development of the fat layer in rabbits according to sexual dimorphism (female on the right, male on the left).

Expressing slaughter weight as a proportion of pre-slaughter live weight reflects the level of animal development. Therefore, in this study, slaughter yield in rabbits was calculated with consideration of sexual dimorphism. The obtained results are presented in Table 2.

Although slaughter yield was slightly higher in females by 1.8% (P < 0.05), the difference in carcass yield was not statistically significant (0.8%; P > 0.05). In contrast, fat yield showed a significant difference of 2.59% (P < 0.001), with higher values observed in the female group.

Table 2

Slaughter Yield of Rabbits by Sex (%)

Parametr	Sex groups			
	Female		Male	
	$\bar{X}\pm S_x$	C_v %	$\bar{X}\pm S_x$	C_v %
Slaughter	55,6±0,30*	2,11	53,8±0,53	3,84
Carcass	50,8±0,27	2,04	51,6±0,52	3,89
Fat	4,77±0,05***	4,26	2,18±0,06	10,01

Note: *-P<0,05; ***-P<0,001

Discussion of the study results. The results of this study demonstrate that, in accordance with sexual dimorphism in Californian rabbits, growth and developmental processes are characterized by two distinct metabolic patterns, namely proteogenic and lipogenic orientations under hormonal regulation.

The observed superiority of females in live weight (2825.7 g) and fat accumulation (2.34 times higher than in males; $P < 0.001$) indicates a predominance of a lipogenic metabolic model. This physiological state can be explained by the role of estrogen hormones, which stimulate lipogenesis and thereby contribute to the formation of energy reserves as an adaptive mechanism for reproductive function.

In contrast, male rabbits exhibited a lower overall body weight but a higher slaughter yield (51.6%), indicating a predominance of a proteogenic metabolic model. The anabolic effect of androgenic hormones (testosterone) enhances the synthesis of myofibrillar proteins and increases muscle deposition, resulting in improved meatiness.

Analysis of variance indicated greater individual variability in fat accumulation in male rabbits. This suggests that targeted genetic selection may be particularly effective for improving meat productivity in males.

Conclusion. The results of this study provide scientific evidence of the biological and production significance of sexual dimorphism in Californian rabbits. It was established that growth and development in rabbits are genetically and physiologically sex-dependent. Female rabbits exhibited a predominantly lipogenic metabolic model, with fat accumulation 2.34 times higher than that of males ($P < 0.001$). In contrast, males demonstrated a predominantly proteogenic metabolic model, characterized by higher carcass yield (51.6%) and greater muscle development.

The findings suggest that considering not only live weight but also sex-specific metabolic profiles in rabbit meat production can improve the efficiency of selecting animals for producing high-quality dietary meat.

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