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QUANTITATIVE INDICATORS OF PIG CARCASSES OF DANISH AND CANADIAN ORIGIN WITH DIFFERENT PRE-SLAUGHTER LIVE WEIGHTS

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Abstract

The article studied the quality of pig carcasses of Danish and Canadian origin, fattened under industrial pig production conditions and slaughtered at pre-slaughter weights of 110 and 130 kg. It was found that animals slaughtered at a live weight of 110 kg had 4.2% higher weight loss during transportation in gilts compared to barrows, and 0.7% higher weight loss in Danish pigs compared to their Canadian counterparts. A significant advantage was found in Danish pigs, with a higher loin weight of 8.8% and 1.0% more meat yield in the carcass, although they experienced a 0.7% increase in weight loss during transportation and fasting. At the same time, Danish gilts significantly outperformed barrows of the same genotype in terms of slaughter yield by 2.4%, loin eye area by 4.3%, and loin weight by 7.3%, but showed 0.6% higher weight loss during transportation. In contrast, Canadian barrows had significantly lower transportation weight losses by 4.8%. When pre-slaughter weight increased to 130 kg, Danish pigs demonstrated significant advantages in bacon half length by 0.8%, loin eye area by 6.8%, loin weight by 4.4%, along with 1.6% higher live weight losses during transportation. When comparing gilts and barrows slaughtered at this live weight of 130 kg, Danish-origin gilts showed significant advantages over barrows in terms of chilled carcass weight by 2.3%, ham weight by 5.3%, and loin weight by 7.6%.

Key words**:** *pig, genotype, growth intensity, carcass quality, pre-slaughter weight, weight loss*

INTRODUCTION

According to researches [25, 32, 48, 30, 67], global pork production is expected to continue growing, as it remains one of the most consumed types of meat worldwide. As reported by [40], in recent years, the growth rate of pork production in EU countries has somewhat slowed, with the exception of Spain, which continues to maintain high levels of production and remains a significant player in the global pork market. According to raports [66], Ukraine exports almost no pork, and the country's self-sufficiency in this product hovers around 90%. At the same time, pork production levels have been steadily

declining due to Russian aggression, the resulting economic crisis, and complex epizootic conditions. To increase the competitiveness of domestic pork production and ensure food security, [35] state that local producers need to mobilize all possible reserves to improve pig productivity and production efficiency. Furthermore, to access European and global markets, the quality of pork must be continuously improved and maintained at global standards. One of the factors for increasing production efficiency is to raise output through the use of modern pig genotypes, which allow for feeding to heavier conditions while maintaining carcass characteristics and meat quality.

The breed characteristics of pigs [9, 18, 24, 26, 28, 29, 33, 41] are a critical component in improving pork production efficiency. This becomes particularly significant [18, 23, 39, 56] when crossbreeding, and even more so when hybridization, is applied. Superior efficiency in pig breeding [1, 20, 24, 38] is achieved when using specialized terminal sires in the final stage of breeding. When hybridization is used, with two-breed maternal lines and terminal sires in the final crossing stage, the commercial pig population [8, 22, 57] shows intermediate inheritance of slaughter and meat traits, as well as meat quality indicators.

Apart from breed type and breeding methods, significant influence on carcass morphometry, composition, and meat quality [1, 7, 28, 44, 46, 47, 55, 58, 68] comes from the sex of the pigs. According to swine scientists [14, 17, 21, 43, 52, 56, 63, 66], in addition to genotype, breeding methods, and sex, the quality of carcasses and the organoleptic properties of meat are also influenced by the feeding method and the composition and nutritional value of the pig diet.

Various authors [4, 5, 10, 12, 37, 39, 45, 48, 65] have also pointed out that pre-slaughter live weight significantly influences carcass characteristics. According to [11, 54,], environmental factors such as air temperature and its fluctuations, humidity, and the duration of daylight also play a significant role in determining slaughter and meat traits in pigs. [62] has reported a substantial impact of the seasons on carcass characteristics and meat quality, while other studies [61] point to the influence of age at slaughter on the morphological composition of carcasses.

Additionally, according to [31], housing conditions and swine management significantly affect carcass and meat quality. In addition to the economic feasibility of selecting slaughter weights, as noted by [15, 16, 32], it is also determined by specific national preferences and government standards. At the same time, advancements in pig breeding for increased leanness and improvements in feeding conditions and feed quality, as reported by [60, 64], allow producers to increase the pre-slaughter weight of pigs without compromising carcass characteristics and meat quality. However, contrasting views have been expressed [29], suggesting that higher slaughter weights may reduce pig growth intensity, worsen feed conversion, and increase subcutaneous fat thickness, leading to a decrease in lean meat content.

In Ukraine, several studies have been conducted on the effects of pre-slaughter weight of pigs of different domestic and foreign genotypes on carcass characteristics and meat quality [2, 6, 19, 23, 35, 36, 40, 48, 50, 53]. At the same time, new pig genotypes from different parts of the world are being continuously imported and their breeding potential tested. The climate in Ukraine is also rapidly changing, with rising temperatures, which imported animals may not be adapted to. According to [49, 50, 51], this can lead to heat stress in pigs, reducing feed intake and growth intensity, and as suggested by [11, 31, 59], may worsen carcass characteristics and lower meat quality.

Thus, the current issue is the study of the relationship between slaughter and meat qualities in new pig genotypes in southern Ukraine and determining the connections between specific slaughter traits to adjust future breeding programs.

MATERIALS AND METHODS

Upon the completion of the study on the fattening qualities of pigs of Danish and

Canadian origin, all the experimental animals were individually weighed and additionally identified by tattooing a number on both of their hind legs. All the pigs were loaded into separate compartments of specialized vehicles, taking into account their weight and origin, and were transported to the slaughterhouse at Globinsky Meat Processing Plant LLC. Upon arrival at the plant, they were weighed in groups and placed in separate pens for further fasting. After the fasting period (24 hours from departure from the pig farm), all the experimental pigs were weighed individually again, and their body weight was marked on their backs with a special marker. Based on the weighing results, four groups of pigs were formed, consisting of an equal number of gilts and castrated boars. The first group included Danish-origin pigs with a weight close to 110 kg, comprising 10 gilts and 10 castrates. The second group consisted of the same number of Canadian-origin pigs with similar weight. The third group included 10 gilts and 10 castrates of Danish origin, weighing close to 130 kg. The fourth experimental group was formed from Canadian-origin pigs of similar weight, consisting of gilts and castrates.

All the pigs were processed in sequential group order at the slaughterhouse, where they were humanely euthanized in gas chamber before being moved to the slaughter conveyor line of the processing department. After scalding in the scalding tank, they were further identified by attaching tags with identical numbers to their hind limbs. After slaughter and carcass processing, the weight of each half-carcass was determined. The pigs were then sent to a cooling chamber to be chilled to 4°C. After 24 hours of cooling, all the experimental pig carcasses were individually weighed upon entering the boning department. In the hanging position, measurements were taken of the backfat thickness (together with the skin) at the 6th-7th thoracic vertebrae, the thickest part of the shoulder, and the sacral vertebrae. The carcass length was measured from the front edge of the first cervical vertebra to the front edge of the pubic symphysis. The length of the bacon side of the carcass was measured from the front edge of the pubic bone to the middle of the front edge of the first rib. After being placed on the conveyor, the weight of the ham was measured, separated by a transverse cut between the last and penultimate lumbar vertebrae without the leg. After isolating the middle section of the carcass, an imprint of the cross-sectional area of the longest back muscle was made on tracing paper between the last thoracic and first lumbar vertebrae. After full deboning of the carcass, the weight of both loins, as well as the weight of the meat, fat with skin, and bones, was recorded. Based on the slaughter results, a comprehensive index of fattening and meat qualities was determined for each group using the method of B. Tyler, as described in the textbook [27], according to the following formula:

$$I = 100 + (242 \times K) - (4.13 \times L) \quad (1)$$

where:

I – comprehensive index of fattening and meat qualities; K – average daily gain in kg; L – backfat thickness at the level of the 6th-7th thoracic vertebrae, mm; 242 and 4.13 – constant coefficients.

The research results were processed biometrically [27], using the applied software packages MS Excel 2016 and Statistica V.5.5. The significance of differences between the indicators of groups of animals of different origins, pre-slaughter weight, and sex was determined using Student's t-test (*$p<0.05$; **$p<0.01$; and ***$p<0.001$).

RESULTS AND DISCUSSIONS

According to the results of the study presented in Tables 1, 2, 3 and 4, it was found that animals slaughtered at a weight close to 110 kg had slightly lower starting weights and average daily gains compared to those slaughtered at 130 kg. As shown in Table 1, the lowest starting weight for fattening was observed in Danish-origin gilts, while the highest was in Canadian-origin barrows. During fattening, the average daily gains varied within 2.0%, with the highest gains in Danish-origin gilts and the lowest in

Canadian-origin gilts. The final weight after fattening ranged from 114.4 kg for Canadian-origin gilts to 116.9 kg for Danish-origin gilts, but this difference was within the margin of statistical error.

However, during transport and fasting, a statistically significant difference ($p<0.01$) in weight loss was observed between Danish-origin gilts, which lost 0.6% more weight than barrows. Additionally, Canadian-origin barrows had 0.4% higher weight loss during transport compared to gilts. When comparing weight loss during transport and fasting between Danish- and Canadian-origin pigs, significantly higher losses (0.7%) were found in Danish-origin animals ($p<0.001$).

Overall, the pre-slaughter live weight of the experimental animals ranged from 109.8 kg in Canadian-origin gilts to 111.3 kg in Canadian-origin barrows, with a 0.3% difference between the control and experimental groups.

Table 1. Weight of pigs at the beginning and end of fattening, their intensity of growth and weight loss during transportation and during starvation of pigs slaughtered at 110 kg

Indicators	Groups					
	I control (Danish origin)			II experimental (Canadian origin)		
	gilts	castrate	group average	gilts	castrate	group average
Starting weight for fattening, kg	28.5±0.57	29.1±0.69	28.8±0.63	29.1±0.63	29.8±0.57	29.45±0.59
Final weight after fattening, kg	116.9±0.96	115.9±1.04	116.4±1.00	114.4±0.46	116.2±0.57	115.3±0.49
Weight loss during transport and fasting, kg	5.9±0.19 *aa*	5.2±0.17	5.5±0.17 *bbb*	4.6±0.11	4.9±0.09 *aa*	4.7±0.11
Weight loss during transport and fasting, %	5.3	4.7	5	4.2	4.4	4.3
Average daily gain, g	911±5.8	895±7.3	903±6.4	880±4.7	891±4.9	885±4.7
Pre-slaughter weight, kg	111.0±0.35	110.7±1.37	110.9±0.93	109.8±0.49	111.3±0.67	110.6±0.53

Notes: aaa – difference between females and males, bbb – difference between Danish and Canadian genetics, ccc – difference between pre-slaughter weights of 110 kg and 130 kg
Source: own calculations.

Regarding weight loss during transport and fasting, a statistically significant difference ($p<0.01$) was found between Danish-origin females, which lost 0.6% more weight than castrates during this period. In contrast, for Canadian-origin animals, castrated males showed 0.4% greater transport-related losses compared to females. A comparison of weight loss during transport between Danish and Canadian-origin pigs revealed significantly higher losses (by 0.7%) in Danish-origin animals ($p<0.001$).

The overall pre-slaughter live weight of the experimental animals ranged from 109.8 kg for Canadian-origin females to 111.3 kg for castrates of the same origin, with the difference between the control and experimental groups being 0.3%.

Thus, in animals slaughtered at a live weight of 110 kg, there was no difference between groups of different origins or between females and castrates regarding either the starting fattening weight or the pre-slaughter live weight. However, a 4.2% higher weight loss during transport and fasting was observed in females compared to castrates, and a 0.7% higher loss was recorded in Danish-origin animals compared to Canadian counterparts.

The slaughter weight is determined by both the pre-slaughter live weight and the slaughter yield. As shown in Table 2, there was no significant difference in slaughter weight between Danish and Canadian-origin animals, nor between pigs of different sexes.

However, a tendency was observed for Danish-origin animals to have a 0.4% higher slaughter weight compared to Canadian-origin animals, and for females to exceed castrates by 1.6%. Additionally, a significantly higher slaughter yield (by 1.7%, $p<0.05$) was found in Danish-origin females compared to castrates.

Weight loss during cooling was equal for the carcasses of animals from both genotypes,

amounting to 1.7 kg. Castrated males, however, lost 0.3 kg more weight during this period compared to females. At the same time, an opposite trend in weight loss was observed between males and females in animals of Danish and Canadian origin.

Measurements of backfat thickness at various locations showed no significant differences between animals of different genotypes or genders. However, in Canadian pigs, there was a tendency for an increase of 1.3 mm in backfat thickness over the 6-7 thoracic vertebrae, an increase of 0.5 mm in the hips, and a decrease of 2.3 mm at the withers. Castrated males demonstrated a reduction in backfat thickness at all three points, ranging from 0.6 to 1.6 mm.

No significant difference was found in carcass length between animals of Danish and Canadian origin, nor between females and castrates. A similar trend was noted for the length of the bacon half of the carcass.

There was no difference in the weight of the hind leg between animals of different genetic origins and opposite sexes, but there was a tendency for a slight increase of 0.4 kg in this measure among Canadian selection animals and the same increase in females compared to castrated males.

No difference was found in the area of the "muscle eye" between animals of Danish and Canadian origin or between males and females of the two genotypes. At the same time, a significant increase of 2.7 cm² ($p<0.05$) in the area of the longest muscle in the back was established in females of Danish origin compared to males of the same origin.

Table 2. Slaughter indicators of Danish and Canadian-origin pigs at a pre-slaughter weight of 110 kg

Indicators	**Groups**					
	I control (Danish origin)			II experimental (Canadian origin)		
	gilts	Castrate	group average	gilts	castrate	group average
Slaughter weight, kg	82.1±0.77	80.1±1.79	81.1±1.19	80.8±0.37	80.2±0.65	80.5±0.51
Slaughter yield, %	74.0±0.41 *a*	72.3±0.72	73.2±0.63	73.6±0.49	72.1±0.66	72.9±0.57
Weight of chilled carcass, kg	80.5±0.71	78.0±1.70	79.2±1.26	79.3±0.35	78.4±0.61	78.9±0.49
Losses after 24 hours of cooling, kg	1.6±0.21	1.9±0.34	1.7±0.29	1.5±0.17	1.8±0.11	1.7±1.14
Losses after 24 hours of cooling, %	1.9	2.3	2.1	1.9	2.2	2.0
Thickness of backfat:						
Above the 6-7th thoracic vertebra, mm	22.1±1.71	21.8±1.81	21.9±1.73	23.6±1.16	22.8±0.76	23.2±0.93
In the loins, mm	16.3±2.13	15.6±2.03	16.0±2.07	16.8±1.76	16.1±0.93	16.5±1.47
At the withers, mm	42.1±1.33	40.4±1.76	41.3±1.52	39.7±1.29	38.3±1.63	39.0±1.47
Length of carcass, cm	99.5±0.74	98.8±1.23	99.1±0.96	100.1±0.93	99.7±0.89	99.9±0.91
Length of bacon half, cm	85.7±0.86	84.3±1.12	85.0±0.93	86.9±0.93	85.1±1.17	86.0±1.06
Weight of hind leg, kg	13.1±0.21	12.8±0.31	13.0±0.25	13.6±0.33	13.1±0.17	13.4±0.26
Area of the longest back muscle, cm²	65.8±0.86 *a*	63.1±1.01	64.5±0.89	63.0±0.96	61.3±1.16	62.2±1.09
Weight of both hams	5.9±0.07 *aaa*	5.5±0.10	5.7±0.08 *bbb*	5.3±0.11	5.1±0.07	5.2±0.09
Meat yield, %	62.8±0.24 *c*	62.2±0.36 *c*	62.5±0.30 *b c*	61.9±0.33	61.2±0.21	61.6±0.23
Composite index of fattening and meat qualities	229.2	226.5	228.1	215.4	221.4	218.4

Notes: aaa - between females and males, bbb - between Danish and Canadian genetic, ccc - between pre-slaughter
weights of 110 kg and 130 kg.
Source: own calculations.

In terms of the combined weight of both hams, Danish pigs had a statistically significant advantage of 0.5 kg ($p<0.001$) over their Canadian counterparts. A statistically

significant advantage of 0.4 kg ($p<0.001$) was also noted for Danish females over males of the same origin regarding this measure. There was also a trend of an increase of 0.2 kg in the weight of both hams in Canadian females compared to males, while the overall advantage of females over castrates was 0.3 kg.

The meat yield from the carcass is currently a commercially significant measure. As seen in Table 2, the meat yield in the carcasses of Danish origin animals was statistically significantly 1.0% higher compared to Canadian counterparts ($p<0.05$). At the same time, there was a trend of a better meat yield, by 1.2%, in Danish pigs slaughtered at a live weight of 110 kg compared to those slaughtered at a live weight of 130 kg. Among Danish females slaughtered at a live weight of 110 kg, the meat yield was significantly higher by 1.2% ($p<0.05$) compared to counterparts slaughtered at 130 kg, while for castrates of the same origin, the difference was 1.4%.

According to the calculation of the comprehensive index of fattening and meat quality, there was an increase of 9.7 points in Danish origin animals compared to Canadian, while the difference between the average indicators for females and castrated males was 1.7 points in favor of castrates.

Thus, when comparing the slaughter indicators of pigs slaughtered at 110 kg, a significant advantage of Danish origin pigs was established regarding the weight of both hams at 8.8% and the meat yield in the carcass at 1.0%, along with an increase in weight loss during transportation and fasting by 0.7%. At the same time, Danish females significantly surpassed castrates of the same genotype in slaughter yield by 2.4%, in the area of the "muscle eye" by 4.3%, and in the weight of both hams by 7.3%, but lagged behind castrates by 0.6% in weight loss during transportation and fasting.

Table 3. Weight of pigs at the beginning and end of fattening, their growth intensity, and weight loss during transportation and fasting of pigs slaughtered at 130 kg

Indicators	**Groups**					
	I control (Danish origin)			II experimental (Canadian origin)		
	Gilts	castrate	group average	Gilts	castrate	group average
Initial weight at the start of fattening, kg	30.1±0.39^{cc}	30.9±0.41^{c}	30.5±0.39 ^{cc}	31.3±0.54 ^{cc}	32.4±0.47 ^{cc}	31.85±0.49 ^{cc}
Weight at the end of fattening, kg	139.1±0.69 ^{ccc}	138.1±0.56 ^{ccc}	138.6±0.57 ^{ccc}	136.3±0.74 ^{ccc}	137.4±0.36 ^{ccc}	136.9±0.57 ^{ccc}
Average daily gain, g	1,123±9.1 ^{ccc}	1,106±6.3 ^{ccc}	1,114±8.5 ^{ccc}	1,083±9.8 ^{ccc}	1,083±7.6 ^{ccc}	1,083±8.4 ^{ccc}
Weight loss during transportation and fasting, kg	8.4±0.11 $^{aaa\ ccc}$	7.9±0.09 ^{ccc}	8.2±0.11 $^{bbb\ ccc}$	6.6±0.08 ^{ccc}	6.5±0.06 ^{ccc}	6.6±0.07 ^{ccc}
Weight loss during transportation and fasting, %	6.4	6.1	6.25	5.1	5.0	5.05
Pre-slaughter weight, kg	130.7±0.55 ^{ccc}	130.2±0.45 ^{ccc}	130.5±0.43 ^{ccc}	129.7±0.69 ^{ccc}	130.9±0.27 ^{ccc}	130.3±0.93 ^{ccc}

Notes: aaa - between females and males, bbb - between Danish and Canadian genetic, ccc - between pre-slaughter weights of 110 kg and 130 kg.
Source: own calculations.

Castrated males of Canadian origin had statistically significantly lower weight losses during transportation and fasting by 4.8%. For the remaining slaughter indicators between females and males slaughtered at 110 kg, no significant difference was found.

Comparing the slaughter qualities of Danish and Canadian pigs slaughtered at 130 kg (Tables 3 and 4), significant advantages were found in Danish genetics animals with a difference of 1.6 kg ($p<0.001$) in weight loss during transportation and fasting, a difference of 0.7 cm in the length of the bacon half of the carcass ($p<0.01$), a difference of 4.9 cm² in the area of the cross-section of the longest muscle in the back, and a difference of 0.3 kg ($p<0.001$) in the weight of both hams.

Comparing the growth intensity and weight losses during transportation and fasting of male and female animals of both genotypes, as well as their slaughter qualities, it was found that the average indicators for females of both genotypes surpassed those of castrates by an average of 9 g in daily weight gain, 0.2% in weight loss during transportation and fasting, 1.1 kg in slaughter weight, 1.0% in dressing percentage, 1.5 kg in cooled carcass weight, and in the weight of both hams. In animals of Danish origin, a significant difference was found in females compared to males regarding weight loss during transportation and fasting (0.3 kg, $p<0.001$), cooled carcass weight (1.2 kg, $p<0.05$), hind leg weight (0.8 kg, $p<0.05$), and the weight of both hams (0.5 kg, $p<0.001$). In contrast, among Canadian-origin pigs, no significant differences were found between males and females for these traits, although a similar trend was observed toward increased values in females compared to castrates.

When comparing the composite index of fattening and slaughter qualities in pigs of Danish and Canadian origin at a slaughter weight of 130 kg, this index was found to be higher by 4.9 points in Canadian pigs. However, for this pre-slaughter weight, the calculated index showed that females outperformed castrates by 1.9 points. At the same time, by genotype, the advantage of females over males was 0.4 points in Danish animals and 1.3 points in their Canadian counterparts.

Thus, with an increase in pre-slaughter weight to 130 kg, a significant advantage was established for Danish pigs in the length of the bacon half by 0.8%, in the area of the "muscle eye" by 6.8%, and in the weight of both hams by 4.4%. However, they exhibited greater losses in live weight during transportation and fasting by 1.6%. When comparing the performance of females and males slaughtered at this live weight, significant advantages were found in Danish animals for cooled carcass weight (2.3%), hind leg weight (5.3%), and the weight of both hams (7.6%). At the same time, they showed higher losses in live weight during transportation and fasting by 1.3%.

In contrast, among Canadian-origin animals, significant advantages were found for females over males in dressing percentage (1.5%), carcass length (0.4%), length of the bacon half (1.9%), hind leg weight (3.6%), and the weight of both hams (4.7%).

According to the composite index of fattening and meat qualities, Danish pigs outperformed their Canadian counterparts by 2.1%, while the difference between the average indicators of females and males of both genotypes was only 0.8% in favor of females.

Comparing the growth intensity and slaughter indicators of pigs of both studied genotypes and both sexes, a superiority was established for almost all studied indicators in animals slaughtered with a higher weight category.

For Danish pigs, an increase in pre-slaughter live weight by 19.6 kg resulted in a slaughter weight increase of 16.4 kg, a 1.5% rise in dressing percentage, a 16.3 kg increase in cooled carcass weight, and a 0.3 kg increase in carcass weight loss after cooling. At the same time, the thickness of fat over the 6th-7th thoracic vertebrae increased by 11.4 mm, in the sacral area by 6.4 mm, carcass length increased by 4.5 cm, and the length of the bacon half also increased by 4.5 cm. Meanwhile, hind leg weight rose by 3.3 kg, the weight of both hams increased by 1.2 kg, the area of the "muscle eye" grew by 8.0 cm², while the yield of meat parts in the carcass decreased by 2.0%.

In pigs of Canadian origin, an increase of 19.7 kg in pre-slaughter live weight was also associated with a highly significant increase in slaughter weight by 18.1 kg, dressing percentage by 2.9%, cooled carcass weight by 21.3 kg, losses in carcass weight after cooling by 0.3 kg, thickness of fat over the 6th-7th

thoracic vertebrae by 7.1 mm, in the sacral area by 6.3 mm, carcass length by 5.6 cm, and the length of the bacon half by 0.7 cm, as well as hind leg weight by 3.4 kg, weight of both hams by 1.4 kg, and area of the cross-section of the longest back muscle by 5.4 cm², with a decrease in the lean portion of the carcass by 1.1%.

Table 4. Slaughter indicators of Danish and Canadian-origin pigs at a pre-slaughter weight of 130 kg

Indicators	Groups					
	I control (Danish origin)			II experimental (Canadian origin)		
	gilts	castrate	group average	gilts	castrate	group average
Slaughter weight, kg	98.3±0.58 *ccc*	96.7±0.74 *ccc*	97.5±0.63 *ccc*	98.8±0.36 *ccc*	98.3±0.52 *ccc*	98.6±0.49 *ccc*
Dressing percentage, %	75.2±0.25*c*	74.3±0.47 *c*	74.7±0.36 *c*	76.2±0.36*aa ccc*	75.1±0.21 *ccc*	75.7±0.23 *ccc*
Cooled carcass weight, kg	96.6±0.47*a ccc*	94.5±0.94 *ccc*	95.5±0.49 *ccc*	97.0±0.63 *ccc*	96.2±0.49 *ccc*	96.6±0.54 *ccc*
Losses after cooling, kg	1.7±0.21	2.2±0.33	2.0±0.30	1.8±0.17	2.1±0.32	2.0±0.24
Losses after cooling 24 hours, %	1.7	2.3	2.0	1.8	2.1	2.0
Thickness of fat:						
Over the 6th-7th thoracic vertebrae, mm	33.7±1.06 *ccc*	32.9±0.74 *ccc*	33.3±0.93 *ccc*	29.9±0.37 *ccc*	30.6±0.42 *ccc*	30.3±0.38*bb ccc*
In the sacral area, mm	22.7±0.98*cc*	22.0±1.67*c*	22.4±1.36 *c*	23.5±1.03 *cc*	22.0±0.93 *ccc*	22.8±0.97 *cc*
At the withers, mm	41.5±1.39	40.5±1.14	41.0±1.25	39.7±0.93	38.3±0.78	39.0±0.83
Carcass length, cm	106.5±0.84 *ccc*	105.0±0.66 *ccc*	105.7±0.73 *ccc*	105.3±0.54*aa ccc*	103.6±0.49*cc*	104.5±0.47 *ccc*
Length of the bacon half, cm	88.4±0.53*c*	86.4±0.51	87.4±0.49 *bb c*	87.5±0.39*aa*	85.9±0.37	86.7±0.37
Hind leg weight, kg	16.7±0.31*a ccc*	15.9±0.23 *ccc*	16.3±0.24 *ccc*	17.1±0.17 *a ccc*	16.5±0.23 *ccc*	16.8±0.19 *ccc*
Area of the cross-section of the longest back muscle, cm²	73.0±0.57 *ccc*	72.0±0.63 *ccc*	72.5±0.59 *bbb ccc*	67.9±0.43 *ccc*	67.3±0.54 *ccc*	67.6±0.49 *ccc*
Weight of both hams, kg	7.1±0.04 *aaa ccc*	6.6±0.08 *ccc*	6.9±0.05 *bbb ccc*	6.7±0.03 *aaa ccc*	6.4±0.03 *ccc*	6.6±0.03 *ccc*
Meat yield in the carcass, %	61.7±0.35	60.8±0.40	61.3±0.37	60.9±0.39	60.1±0.51	60.5±0.46
Composite index of fattening and meat qualities	232.7	231.8	232.2	238.5	235.7	237.1

Notes: aaa - between females and males, bbb - between Danish and Canadian genetic, ccc - between pre-slaughter weights of 110 kg and 130 kg
Source: own calculations.

Comparing the changes in slaughter indicators between pigs of different sexes, it was established that in gilts, an increase in pre-slaughter live weight by 19.8 kg resulted in a highly significant increase in slaughter weight by 17.1 kg, dressing percentage by 1.9%, cooled carcass weight by 20.5 kg, losses in carcass weight after cooling by 0.2 kg, thickness of fat over the 6th-7th thoracic vertebrae by 9.0 mm, in the sacral area by 6.6 mm, carcass length by 6.3 cm, and the length of the bacon half by 1.6 cm, hind leg weight

by 3.4 kg, weight of both hams by 1.3 kg, area of the cross-section of the longest back muscle by 7.0 cm², and led to a decrease in meat yield in the carcass by 1.3%. Meanwhile, in castrated males, an increase of 19.2 kg in live weight before slaughter caused a significant increase in slaughter weight by 18.4 kg, dressing percentage by 3.5%, cooled carcass weight by 18.6 kg, thickness of fat over the 6th-7th thoracic vertebrae by 9.5 mm, in the sacral area by 7.3 mm, at the withers by 1.3 mm, carcass length by 6.9 cm, and the length of the bacon half by 3.3 cm, hind leg weight by 4.0 kg, weight of both hams by 1.6 kg, area of the cross-section of the longest back muscle by 7.5 cm², and led to a decrease in losses in carcass weight after cooling by 0.1 kg and meat yield in the carcass by 0.4%.

With the increase in pre-slaughter live weight from 110 to 130 kg, there was an increase in the composite index of fattening and meat qualities in all animals. As shown in Table 4, in pigs of Danish origin, this increase amounted to 4.1 points, while in Canadian-origin animals, it was 18.7 points. When comparing changes in the calculated index in pigs of different sexes, it was found that in gilts, this index increased by 13.3 points, whereas in castrates, the increase was only 9.8 points.

Thus, in pigs of Danish origin, an increase in pre-slaughter live weight by 17.6% resulted in an increase in slaughter weight by 20.2%, dressing percentage by 1.5%, cooled carcass weight by 20.6%, thickness of fat over the 6th-7th thoracic vertebrae by 52.0%, in the sacral area by 39.7%, carcass length by 4.5%, and the length of the bacon half by 2.8%, hind leg weight by 25.4%, weight of both hams by 20.2%, area of the cross-section of the longest back muscle by 12.4%, as well as a decrease of 0.1% in losses of carcass weight after cooling and 1.3% in meat yield. In pigs of Canadian origin, an increase in pre-slaughter live weight by 17.8% resulted in an increase in slaughter weight by 22.4%, dressing percentage by 2.9%, cooled carcass weight by 28.3%, thickness of fat over the 6th-7th thoracic vertebrae by 30.4%, in the sacral area by 37.9%, carcass length by 5.6%, and the length of the bacon half by 0.8%, hind leg weight by 25.4%, weight of both hams by 26.0%, area of the cross-section of the longest back muscle by 8.7%, with a decrease in losses of carcass weight after cooling by 0.1% and the lean portion of the carcass by 1.1%.

Comparing the dynamics of changes in slaughter indicators in pigs of different sexes with an increase in pre-slaughter weight from 110 to 130 kg, it was established that in gilts, slaughter weight increased by 21.0%, dressing percentage by 1.9%, cooled carcass weight by 26.9%, thickness of fat over the 6th-7th thoracic vertebrae by 39.2%, in the sacral area by 39.6%, carcass length by 6.3%, and the length of the bacon half by 1.8%, hind leg weight by 26.6%, weight of both hams by 23.2%, area of the cross-section of the longest back muscle by 10.9%, and led to a decrease in losses of carcass weight after cooling by 0.1% and meat yield in the carcass by 1.3%. At the same time, in castrates, there was an increase in slaughter weight by 23.0%, dressing percentage by 3.5%, cooled carcass weight by 23.8%, thickness of fat over the 6th-7th thoracic vertebrae by 42.6%, in the sacral area by 45.7%, at the withers by 3.2%, carcass length by 6.9 cm, and the length of the bacon half by 3.8 cm, hind leg weight by 30.5%, weight of both hams by 30.2%, area of the cross-section of the longest back muscle by 11.8%, and caused a decrease in losses of carcass weight after cooling by 0.5% and meat yield in the carcass by 0.4%.

The composite index of fattening and meat qualities increased by 1.8% in pigs of Danish origin, while in Canadian-origin animals, this increase was 8.6%, meaning that in Canadian pigs, this index rose by 13.3% more compared to Danish-origin animals. In gilts, on average, this index increased by 13.3%, while in castrates, it increased only by 9.8%.

Our conclusions regarding the significant advantage of Danish-origin pigs by 8.8% for the weight of both hams and 1.0% for meat yield in carcasses align with the results published in the works [24, 25, 32, 38], which also indicate a significant influence of genotype on the slaughter qualities of pigs. Our findings that gilts significantly surpassed castrates of the same genotype in terms of slaughter yield by 2.4%, muscle eye area by

4.3%, and the weight of both hams by 7.3% are consistent with reports [29], which stated that castrates had a lower yield of lean carcass parts compared to gilts, and other [34], which reported higher meatiness of gilts' carcasses compared to those of castrates. However, these findings do not align with reports [40, 48], which noted that surgically castrated boars had reduced carcass yield and less backfat thickness compared to gilts, as our research did not find a significant difference in backfat thickness between males and females, and Danish-origin gilts had a higher slaughter yield compared to boars.

Our conclusions regarding the probable advantage of pigs with increased pre-slaughter weight from 110 to 130 kg in terms of bacon half-length by 0.8%, muscle eye area by 6.8%, and the weight of both hams by 4.4% are consistent with reports [2, 6, 24, 35, 42, 48, 50], which state that pigs slaughtered at a pre-slaughter weight of 130 kg significantly outperformed their counterparts slaughtered at a weight of 110 kg in terms of slaughter weight, cooled carcass weight, backfat thickness over the 6-7 thoracic vertebrae, in the withers and in the loins, carcass length, and its bacon half, ham weight, and muscle eye area. At the same time, our data contradict reports [3], which found no relationship between backfat thickness and meatiness of the carcass based on the pre-slaughter weight of hybrid American pigs, and with reports [13], which noted that with an increase in pre-slaughter weight, there was a significant increase in carcass weight, but it did not affect the proportions of muscle tissue, fat, and bones. They found no evidence that increasing slaughter weight deteriorates carcass characteristics.

Considering the dynamic changes in genetic material in pig farming in Ukraine, we deem it appropriate to continue researching the changes in meat qualities of foreign-genotype pigs at varying pre-slaughter weights.

CONCLUSIONS

It has been established that Danish-origin animals, compared to Canadian-origin counterparts slaughtered at a live weight of 110 kg, have advantages in the weight of both loins and meat yield in the carcass, along with increased weight loss during transportation. When the pre-slaughter weight was raised to 130 kg, a significant advantage was noted for Danish pigs in the length of the bacon half, the area of the "muscle eye," and the weight of both loins, although they exhibited greater weight loss during transport.

It has been proven that at a slaughter weight of 110 kg, Danish sows outperformed castrates of the same genotype in terms of slaughter yield, muscle eye area, and the weight of both loins but fell short against castrates regarding weight loss during transportation. In contrast, Canadian-origin castrates had significantly lower weight loss during transport.

It has been established that at a live weight of 130 kg, Danish sows exceeded castrates in terms of the weight of the chilled carcass, ham weight, and the weight of both loins. However, they lagged behind in live weight loss during transport. At the same time, among Canadian-origin animals, female advantages over males were observed in slaughter yield, carcass length, bacon half length, ham weight, and the weight of both loins.

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