Scientific Papers. Series D. Animal Science. Vol. LXIX, No. 1, 2026
ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750

PERFORMANCE, CARCASS TRAITS, AND PRODUCTIVE POTENTIAL OF SUFFOLK CROSSBRED LAMBS WITH ROMANIAN BREEDS: A LITERATURE REVIEW

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Abstract

This review compiles multi-decade results on crossbreeding Suffolk rams with major Romanian local sheep breeds - Tsigai, Tsurcana, Teleorman Black Head, Spanca, and Merino-type populations. Data extracted from previously published studies highlight significant improvements in pre-weaning growth, fattening efficiency, carcass classification, meat composition, and adult morpho-productive traits in F_1 crossbreds. Suffolk inheritance led to higher birth weights, increased weaning weights, and superior average daily gains compared to pure local breeds. Carcass evaluations using the EUROP system indicated substantial progress in muscularity (frequent U and R scores) and desirable fat cover classes. Meat quality assessments confirmed higher meat percentages and improved meat-to-bone ratios. Adult F_1 animals also demonstrated larger body frames and greater productive potential. Collectively, reviewed findings show that Suffolk crossbreeding enhances growth performance and carcass value while maintaining the adaptive resilience of local breeds, supporting its continued use for improving meat production in Romanian sheep farming.

Key words*: lamb performance, meat quality, Romanian breed, Suffolk.*

INTRODUCTION

The improvement of meat production in sheep farming remains a central objective of modern animal husbandry, especially in production systems where indigenous breeds possess remarkable adaptive qualities but show moderate performance in growth rate and carcass yield. Romania hosts several well-established local breeds - such as Tsigai, Tsurcana, Teleorman Black Head, and Merino-derived populations - each adapted to specific ecological zones and extensive grazing systems. These breeds are valued for their resilience, prolificacy, and ability to sustain production under low-input conditions; however, their meat production potential is limited by relatively low average daily gains and variable carcass conformation (Ilișiu et al., 2011; Zamfir et al., 2017). An empirical study conducted from Ilișiu et al. (2013) indicated that most sheep farmers in the traditional Tsigai region intend to enhance their flocks' genetic potential and herd size by crossing with Suffolk meat breed.

The Suffolk breed, internationally recognized for its superior meat production traits, has been widely used as a terminal sire in crossbreeding programs to enhance growth and carcass quality in lambs. Suffolk rams transmit rapid growth, excellent muscularity, early maturity, and desirable carcass characteristics that align with EUROP classification standards. Early Romanian research emphasized the significant improvement potential of Suffolk when crossed with local ewes, with some of the first evaluations showing notable increases in growth rate and slaughter performance (Ciolcă & Timariu, 1972; Pop et al., 1974, cited by Pop et al., 2007).

Subsequent studies carried out in different geographical regions confirmed that Suffolk × local breed F_1 lambs exhibit higher birth weights, improved suckling growth, and

superior weaning weights compared with purebred Tsigai or Tsurcana lambs (Vlaic et al., 2008; Popa et al., 2009; Popa et al., 2011; Popa et al., 2013). Additional evaluations demonstrated consistent improvements in post-weaning fattening ability and feed utilization efficiency, with lower Net Energy Meat (NEM) requirements per unit of gain in Suffolk crossbreds compared with local breeds (Ghiță et al., 2011; Zamfir et al., 2017).

Carcass quality studies further support the advantages of Suffolk inheritance. When assessed using the EUROP classification system, Suffolk × local breed lambs commonly achieved U and R conformation classes, in contrast with pure local lambs, which were more frequently classified in O or R classes (Ilișiu et al., 2011; Negre et al., 2020). Fat cover was also more favorable in crossbreds, with a higher proportion of animals falling within the commercially desirable 2 and 3 fat classes. Meat quality analyses revealed enhanced carcass composition, including higher meat percentages and improved meat-to-bone ratios in F_1 lambs relative to maternal breeds (Zamfir et al., 2017; Ilișiu et al., 2011).

Despite the abundance of individual studies, a comprehensive synthesis of Suffolk × Romanian local breed crossbreeding results has been lacking. This review aims to integrate multi-decade data to provide a clear and structured evaluation of how Suffolk genetics influence growth, fattening efficiency, carcass characteristics, and morpho-productive traits in Romanian sheep production systems.

MATERIALS AND METHODS

This review was carried out through a structured and systematic analysis of published research addressing the performance of Suffolk × Romanian local sheep crossbreeding. A comprehensive literature search was conducted in 2025 in several scientific databases, including Web of Science, Scopus, Google Scholar, CAB Abstracts, ScienceDirect, and the Romanian national academic repositories (e.g., USAMV institutional archives). The search strategy used combinations of keywords such as *"Suffolk crossbred lambs", "Romanian local sheep breeds", "Tsigai", "Tsurcana", "Teleorman Black Head", "Merino", "growth performance", "carcass quality",* and *"EUROP classification"*. Boolean operators (AND/OR), phrase searching, and breed-specific terms were applied to maximize relevance.

Inclusion criteria consisted of: (1) studies published up to and 2025; (2) research involving Suffolk rams crossed with Romanian local ewe breeds; (3) studies reporting quantitative data for at least one of the following categories: pre-weaning growth, fattening performance, carcass quality, meat composition, or adult morpho-productive indicators; (4) peer-reviewed articles, conference proceedings, doctoral theses, and institutional research reports.

Exclusion criteria included: (1) studies lacking numerical data; (2) purely genetic or molecular studies without productive traits; (3) crossbreeding trials not involving Suffolk as breed.

All data extracted for this review originated from studies listed in the provided tables. These tables served as the primary dataset, which was checked against the original publications when available. For each study, specific variables were recorded: birth weight, 30-day weight, weaning weight, average daily gain, slaughter percentage, EUROP carcass classification scores, tissue composition, wool traits, and adult body measurements.

Data extraction followed a standardized procedure:

- compilation of numerical values in comparative matrices;
- categorization into five trait groups: growth performance, fattening efficiency, carcass quality, meat/tissue composition, and adult morpho-productive indicators;
- cross-breed comparison, with emphasis on differences between F_1 crossbreds and the corresponding maternal pure breeds;
- qualitative interpretation;

Because the reviewed studies used different sample sizes, management systems, and regional conditions, no meta-analysis or statistical pooling was attempted. Instead, a narrative comparative synthesis was employed to highlight consistent trends across decades of research. This methodological approach ensures a reliable and integrative evaluation of

Suffolk crossbreeding outcomes in Romanian sheep production.

RESULTS AND DISCUSSIONS

Growth parameters during the suckling period

The data summarized in Table 1 demonstrate clear differences between local Romanian breeds and their F_1 crosses with Suffolk rams. F_1 lambs consistently exhibit higher birth weights, indicating a positive influence of Suffolk genetics and heterosis on prenatal development (Vlaic et al., 2008; Popa et al., 2009). For instance, F_1 S × TA lambs reached 4.3-4.5 kg at birth, compared with 3.3-3.6 kg in pure Tsurcana lambs. During the suckling period, F_1 lambs also show superior growth performance, measured both by weight at 30 days and weaning weight.

Table 1. Growth parameters during the suckling period in lambs from local breeds and F_1 crossbreds with the Suffolk breed

Genotype	Sex	Body weight - kg			WA (d)	Average daily gain - g			Author/ Location
		Birth	30 d	WW		Birth - 30 d	60 - W	Birth - W	
F_1 S x TI	M; F	3.35; 3.11	-	20.88; 20.88	89;88	-	-	195; 199	Vlaic et al. (2008), Jucu
TI	M; F	3.60; 3.40	-	17.26; 16.50	84;87	-	-	163; 151	
F_1 S x TA	M; F	4.33; 4.00	11.93; 11.57	25.03; 23.96	90	253; 252	199; 186	-	Popa et al. (2009), Sibiu
TA	M; F	3.63; 3.30	9.60; 8.40	18.70; 16.50	90	199; 170	138; 109	-	
F_1 S x TA	M; F	4.30; 3.90	-	20.95; 19.60	70	-	-	238; 224	Popa et al. (2011), Sibiu
TA	M/F	3.60/3.30	-	16.20/15.25	70	-	-	180/171	
F_1 S x TBH	M + F	5.36	15.03	24.92	60	-	-	322	Ghiță et al. (2011), INCDBNA Balotesti
TBH	M + F	4.77	13.40	18.31	60	-	-	253	
F_1 S x TA	M/F	4.52/3.87	-	25.52/23.87	90	-	-	-	Popa et al. (2013), Sibiu
TA	M/F	3.69/3.35	-	18.58/16.69	90	-	-	-	

TI – Tsigai breed; TA – Tsurcana breed; TBH – Teleorman Black Head breed; S – Suffolk breed; W – weaning; WA – weaning age; d – day; - = not reported.

Average daily gain (ADG) from birth to weaning was consistently higher in F_1 crosses, with increases of up to 30-35% compared to local breeds. This enhanced early growth is important for production systems targeting lambs for market at 90 days, as faster growth reduces time to slaughter and improves feed efficiency. The observed differences are consistent across studies and regions, confirming the robustness of Suffolk influence on pre-weaning performance.

Although the numerical differences between studies are evident, several critical aspects must be considered when interpreting these results:

i) Variability between studies and experimental conditions

The data originate from different studies (Vlaic et al., 2008; Popa et al., 2009; 2011; 2013; Ghiță et al., 2011), conducted in different years, locations, and management systems (Jucu, Sibiu, Balotești) introduces:

- variability in feeding systems;
- differences in environmental and climatic conditions;
- possible differences in flock health status;
- differences in maternal nutrition and milk production;

ii) Birth weight - genetic effect vs maternal effect

While higher birth weights of F1 lambs is attributed to Suffolk genetics and heterosis, birth weight is strongly influenced by:

- maternal nutrition during gestation;
- parity and body condition of ewes.

The lack of detailed information regarding parity and litter size makes it difficult to isolate the heterosis component from maternal environmental influences.

iii) Average daily gain (ADG) - consistency vs. biological interpretation

The reported 30-35% increase in ADG in F1 lambs is substantial and economically relevant,

but the following aspects should also be taken into consideration:

- in some cases, 30-day weights are missing, reducing the ability to evaluate growth dynamics;
- weaning ages vary (60, 70, 84-90 days), which complicates direct comparison of ADG values;
- some datasets combine males and females (M + F), while others separate them, potentially masking sex-related growth differences.

Without statistical parameters, it is not possible to evaluate whether the reported differences are statistically significant or only numerically superior.

Fattening efficiency

Table 2 provides insights into post-weaning growth performance and energy efficiency of F_1 crossbred lambs compared to pure local breeds. Net Energy Meat (NEM) represents the amount of energy required to produce 1 g of body weight gain. Lower NEM values indicate better feed conversion efficiency, which is crucial for reducing production costs and improving profitability. Suffolk crossbreds consistently demonstrated lower NEM requirements, suggesting that the genetic contribution of Suffolk rams enhances metabolic efficiency. For instance, S × TI lambs required 7938 kcal/gain, compared with 8243 kcal/gain for Transilvania Merino × Suffolk lambs (Ciolcă & Timariu, 1972). This difference illustrates how crossbreeding can improve energy utilization by promoting lean tissue deposits over fat accumulation.

F_1 lambs also exhibited higher average daily gains (ADG) during the fattening period, ranging from 203 to 256 g/day, compared with 170-198 g/day in pure local breeds. This enhanced growth rate is particularly advantageous for meat production systems targeting early market weights, as faster-growing lambs reach slaughter weight sooner, reducing feed and maintenance costs. Moreover, the observed slaughter percentages were consistently higher in F_1 crossbreds, sometimes reaching 57%, reflecting superior carcass composition with a higher proportion of muscle and lower fat deposition. These characteristics align with consumer preferences for leaner meat and with market requirements for uniform carcass quality.

Table 2. The results of fattening of F_1 crossbred lambs

Maternal breed	Paternal breed	Fattening and slaughter results			Author/Year
		Average daily gain - g -	NEM* kcal/gain	Slaughtering percentage - % -	(Ciolcă & Timariu, 1972)
Transilvania Merino	Suffolk	203	8243.20	53.8	
Spanca		256	7948.80	57.0	
Tsigai		198	7948.80	55.4	
Tsurcana		170	9273.60	50.3	
Suffolk	Tsigai	228	7938.15	-	Pop et al. (1974), cited by Pop et al. (2007)
Tsigai	Suffolk	174	7938.15	-	Pop et al. (1974), cited by Pop et al. (2007)
Suffolk	Tsigai	238	7520.54	51.9	Ilișiu et al. (2010)
Suffolk	Transilvania Meriono	209	-	-	Maier (1975), cited by Pascal (2007)
Suffolk	Merino	229	-	55.9	Zamfir et al. (2017)
Suffolk	Teleorman Black Head	-	-	54.5	Ghiță et al. (2011)

*The NU (nutrient unit) reported value were transformed in NEM according to Burlacu et al. (2002)

The improved fattening performance of crossbreds can be explained by heterosis, which enhances growth rate, feed efficiency, and muscular development. Suffolk sires contribute alleles associated with rapid postnatal growth, efficient protein deposits, and skeletal development, while local breeds provide adaptation traits, such as tolerance to local environmental conditions and pasture utilization efficiency. This combination allows

F_1 lambs to maximize growth without compromising adaptability or robustness.

From a practical standpoint, these findings suggest that Suffolk × local breed crossbreeding is an effective strategy for intensive and semi-intensive meat production systems. Producers can expect faster growth, improved feed efficiency, and higher slaughter yield, translating into greater economic returns. Additionally, the reduced energy requirement per gram of gain (lower NEM) implies a more sustainable system, with lower feed input per unit of meat produced.

However, variability between studies should be taken into consideration. The data originate from experiments conducted in different years, under diverse management and feeding systems, which may significantly influence fattening performance and slaughter parameters. Differences in housing conditions, feed quality, energy-protein balance, health status, and fattening duration can affect average daily gain and slaughter yield.

Moreover, some results may reflect optimized experimental conditions rather than commercial farm realities, potentially leading to an overestimation of performance parameters. The lack of uniform experimental design and incomplete reporting of statistical indicators further limits strict comparative interpretation across studies.

Carcass quality according to the EUROP system

F_1 crossbred lambs (Table 3) consistently achieved superior carcass conformation and fat cover compared with pure local breeds. Regarding carcass conformation, most F_1 lambs were classified in the U (very good) or R (good) categories, whereas local breeds were predominantly in the O (average) or R (good) categories (Ilișiu et al., 2011; Negre et al., 2020). This distribution indicates enhanced muscular development in crossbreds, particularly in the loin, back, and hindquarters, which are the most valuable parts of the carcass for meat production. The contribution of Suffolk genetics likely promotes faster muscle fiber proliferation and greater lean tissue deposition, resulting in improved carcass conformation.

Concerning fat cover, F_1 lambs were mostly classified in classes 2 (thin) and 3 (average), which represent the optimal range for commercial markets. This ensures adequate marbling and palatability without excessive fat deposition, improving consumer acceptance and market value. Local breeds showed more variable distribution, with some individuals in class 4 (thick), which may affect uniformity and marketability.

However, the relationship between growth rate and fat deposition must be interpreted carefully.

i) Market variability and commercial implications

Carcass value is highly market-dependent:

- Southern European and Mediterranean markets often prefer lighter carcasses with moderate fat cover.
- Western European markets may favor heavier carcasses with better conformation (U class).
- Export markets can impose strict fat limits.

Table 3. Carcass quality appreciation with the EUROP system at young ovine from different genotypes

Specification	**Ilișiu et al. (2011)**		**Negre et al. (2020)**	
	TI, %	F_1 S × TI	MP, %	F_1 S x MP
I. Class after conformation				
- E - excellent	-	-	-	-
- U - very good	-	60.0	-	100.0
- R - good	40.0	40.0	100.0	-
- O - average	60.0	-		-
- P weak	-	-	-	-
II. Class after the layer of fat				
- 1 - small	-	-	-	-
- 2 - thin	-	60.0	33.0	-
- 3 - average	60.0	40.0	67.00	100.0
- 4 - big	40.0	-	-	
- 5 - very big	-	-	-	-

Therefore, the superiority of F1 carcasses may vary depending on the target market. A genotype optimized for rapid growth and high conformation may not always align with consumer preferences for leaner meat or specific carcass weights.

ii) Potential trade-offs: growth vs. fat deposition

Crossbreeding with Suffolk improves growth rate and muscular conformation, but biological trade-offs must be considered:

Rapid growth vs. fat accumulation

Faster-growing lambs may deposit fat earlier if slaughter is delayed, potentially reducing carcass classification.

Muscle development vs. meat quality traits

Increased muscularity does not automatically imply improved meat quality (tenderness, intramuscular fat, flavor). Without compositional analysis (protein %, fat %, moisture), it is not possible to determine whether meat quality improved proportionally.

Efficiency vs. adaptability

While F1 lambs show superior carcass traits, local breeds may offer better adaptability and resilience under extensive systems. Under suboptimal feeding, genetic potential for superior conformation may not be fully expressed.

Tissue composition and meat quality indicators of carcasses

The tissue composition and meat quality indicators of carcasses from purebred and F_1 crossbred lambs are presented in Table 4. The data reveal significant differences between local breeds and F_1 crossbreds in meat, bone, and fat proportions, as well as in meat-to-bone and meat-to-fat ratios.

F_1 crossbreds consistently showed higher meat percentages and lower bone content compared with local breeds. For example, F_1 S × TI lambs had 62.53% meat and 18.84% bone, whereas pure TI lambs had 57.85% meat and 20.11% bone (Ilișiu et al., 2011). This represents a clear improvement in carcass yield and lean tissue deposition, which is crucial for commercial meat production. Similarly, the meat-to-bone ratio, an important indicator of carcass quality, was higher in crossbreds (3.32 in F_1 S × TI *vs*. 2.88 in TI), indicating more efficient allocation of body mass to edible muscle tissue.

Fat deposits also differed between genotypes. F_1 S × TI lambs had 18.63% fat compared with 22.04% in TI, reflecting a more balanced carcass composition with adequate energy reserves but not excessive fat, which aligns with market and consumer preferences for lean meat. The meat-to-fat ratio was also improved in crossbreds (3.35 *vs.* 2.62 in TI), further supporting the efficiency of Suffolk genetics in promoting lean growth while controlling fat accumulation.

Table 4. Tissue composition and meat quality indicators of carcasses

Genotyp	Meat (%)	Bone (%)	Fat (%)	Meat/ bone ratio	Meat/ fat ratio	Author and year
PM	60.72	23.32	15.96	2.60	-	Zamfir et al. (2017)
F1 S x PM	59.13	22.42	18.45	2.63	-	
TI	57.85	20.11	22.04	2.88	2.62	Ilișiu et al. (2011)
F1 S x TI	62.53	18.84	18.63	3.32	3.35	
TBH	-	-	-	2.19	-	Ghiță et al. (2011)
F1 S x TBH	-	-	-	2.68	-	

Similar trends were observed in other crossbreeds. F_1 S × PM (Palas Merino) lambs had slightly lower meat percentages than pure PM (59.13% *vs.* 60.72%), but a higher meat-to-bone ratio (2.63 *vs.* 2.60), indicating better carcass composition for processing purposes.

F_1 S × TBH crossbreds had a meat-to-bone ratio of 2.68 compared with 2.19 in TBH, highlighting the positive impact of crossbreeding on skeletal efficiency and edible yield (Ghiță et al., 2011).

Overall, these results confirm that Suffolk crossbreeding enhances carcass quality by increasing lean tissue proportion, improving meat-to-bone and meat-to-fat ratios, and reducing excessive fat deposition.

Morpho-productive indicators of adult F_1 crossbreds compared to maternal breeds

Table 5 summarizes the morpho-productive characteristics of adult F_1 crossbred sheep in comparison with their respective maternal breeds. The results reveal that F_1 crossbreds exhibited a consistent advantage over maternal breeds. For instance, F_1 S × MP rams reached 109.86 kg compared to 89.50 kg in pure MP rams, representing a 22.9% increase in adult body weight (Zamfir et al., 2012). Similarly, F_1 S × TA males and females were heavier than their TA counterparts (61.70 kg *vs*. 50.40 kg for males, and 47.15 kg *vs.* 40.10 kg for females). This demonstrates the effect of Suffolk genetics in enhancing growth potential, likely due to improved muscle development and skeletal frame, a clear manifestation of heterosis. In terms of wool production, F_1 S × MP rams produced 6.47 kg compared with 9.10 kg in MP rams. This reduction may reflect a trade-off between meat and wool traits, where selection for growth and muscularity in crossbreds slightly reduces wool yield. Wool length and fiber diameter also showed variations: F_1 S × MP rams had shorter and finer fibers than maternal MP, suggesting a modification of wool characteristics due to crossbreeding. For F_1 S × TA lambs, data are more limited, but ranges indicate a tendency for moderate wool production and fiber fineness, still within acceptable market ranges for Tsurcana wool.

Table 5. The morpho-productive indicators at the F1 crossbred adult animal comparatively to maternal breed

Genotyp	Sex	Body weight (kg)	Wool production (kg)	Wool length (cm)	Wool fiber diameter (µm)	Author and year
F_1S x MP	M	109.86	6.47	7.71	23.71	Zamfir et al. (2012)
MP	M	89.50	9.10	10.33	21.33	
F_1S x TA	M	61.70*	-	-	-	Popa et al. (2011)* Pădeanu et al. (2015)** Zamfir et al. (2022)*** Enciu et al. (2024)****
TA	M	50.40*	6.4 ≈ 8.2****	22 ≈ 30***	44.92 ≈ 59.79****	
F_1S x TA	F	47.15*	-	-	-	
TA	F	40.10*	2.3 ≈ 4.9****	30.89**	37.03 ≈ 46.67****	

≈ - interval

Overall, F_1 crossbreds combine superior growth and body size with wool traits that remain commercially viable. The increase in body weight and skeletal dimensions enhances meat yield, whereas wool characteristics are influenced by maternal genetics and are adequate for local textile production. This balance makes F_1 crossbreds suitable for dual-purpose systems in which both meat and wool are economically important.

The results highlight the practical benefits of crossbreeding Suffolk rams with local breeds, providing animals that outperform maternal breeds in growth and carcass yield while maintaining wool quality within acceptable limits. Such information is essential for breeders aiming to optimize profitability and efficiency in sheep production systems.

Main body dimensions of adult F_1 S × MP rams compared to maternal breed

Table 6 summarizes the morphometric measurements of adult F_1 S × MP rams in comparison with the maternal MP breed. All recorded parameters, indicate superior structural development in F_1 crossbreds.

These morphometric improvements demonstrate the positive influence of Suffolk genetics in enhancing frame size, structural robustness, and muscular potential, while maintaining balance and functional conformation in crossbred rams. The data confirm that F_1 S × MP rams are larger, more robust, and structurally superior compared with pure maternal MP rams, which translates into higher meat production potential and overall productivity for meat-oriented systems.

Table 6. Main body dimensions at the rams of F_1 S x MP comparatively to maternal breed (Zamfir et al., 2012)

Item	UM	Genotyp		Differences between F_1 S x M and MP	
		F_1 S x MP	MP	± cm	± %
Height at withers	Cm	76.00	70.11	+ 5.85	+ 8.40
Height at croup	Cm	75.86	71.11	+ 4.75	+ 6.68
Length of body	Cm	82.43	75.26	+ 7.17	+ 9.53
Length of croup	Cm	29.14	25.96	+ 3.18	+ 12.24
Width at shoulders	Cm	29.14	23.66	+ 5.48	+ 23.16
With at hip-femur articulations	Cm	30.14	24.59	+ 5.55	+ 22.57
Depth of thorax	Cm	36.57	34.15	+ 2.35	+ 6.88
Width of thorax	Cm	32.14	30.33	+ 1.81	+ 5.97
Thoracic perimeter	Cm	102.14	100.74	+ 1.40	+ 1.39
Perimeter of shinbone	Cm	11.50	11.30	+ 0.20	+ 1.77

Limitations of the crossbreeding strategy

While crossing local breeds with Suffolk improves growth rate, carcass conformation, and pre-weaning performance, several limitations and long-term considerations should be explicitly acknowledged:

Genetic dilution of local breeds

Repeated crossbreeding can reduce the genetic purity of local breeds, potentially eroding unique adaptive traits such as disease resistance, mothering ability, and resilience to extensive or harsh environments.

Long-term sustainability

Dependence on crossbreeding for production gains may compromise the long-term sustainability of local breeds. Maintaining purebred populations is essential to preserve biodiversity and ensure a genetic reservoir for future breeding programs.

Dependency on imported genetics

Using Suffolk rams requires continuous access to high-quality imported genetics, which can be costly and vulnerable to supply disruptions. This reliance may also limit local farmers' self-sufficiency and increase production risks.

CONCLUSIONS

The integrative analysis of the literature consistently highlights the superiority of F_1 hybrids produced using Suffolk rams as terminal sires, confirming the efficiency of this strategy for improving meat production in Romanian sheep farming. The consistency of results, regardless of maternal breed, study period, or rearing conditions, underscores the robustness of the Suffolk genetic contribution and supports the continuation and expansion of crossbreeding programs at the national level. Furthermore, the analyzed data indicate that this breeding approach aligns with current demands for carcass type and production efficiency, providing a clear genetic solution for optimizing economic performance. Overall, the systematic use of this crossbreeding scheme can significantly enhance the competitiveness of the Romanian sheep sector by producing more productive animals without compromising the adaptability of local breeds to specific rearing conditions.

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