Improvement of lamb production in Romania by crossbreeding of local Tsigai breed with high performance breeds

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Abstract

The Tsigai breed comprises 18 % of the entire Romanian sheep populaton, taking second place after the Turcana breed (69.9 %). These breeds are kept in mountain and submontain regions with large areas of pastures (24 % of the total pastures of Romania are located in these areas), which could be used for grazing with crossbreed lambs. For this reason, we preferred to use the Tsigai breed as the local breed for crossbreeding with specialized breeds for meat production in this experiment. The F1-heterosis-effect is used for this production improvement.

The results of a 100-day fattening experiment with young male Suffolk x Tsigai sheep, German Blackface x Tsigai young sheep and Tsigai young sheep are presented in this paper. The resulting crossbreed lambs and Tsigai pure breed young sheep were maintained under the same conditions, received the same food, and benefited from the same microclimate factors during entire fattening period. At the end of fattening, the crossbreed groups recorded higher mean of total gain than the control group (23.83 ± 0.67 kg to Suffolk x Tsigai, 22.62 ± 0.49 kg to German Blackface x Tsigai vs. 20.11 ± 0.56 kg to Tsigai, respectively $p < 0.001$, $p < 0.01$).

The lambs of crosses have a greater slaughter yield, with 2.50 percentage points to Suffolk x Tsigai ($p < 0.001$) and with 2.00 percentage points ($p < 0.001$) to German Blackface x Tsigai, comparatively to the Tsigai breed.

The carcasses of crossbreed lambs (5 from each genotype) have more meat of first quality. Statistically significant differences were recorded regarding the gigot (6.65 ± 0.09 kg, $p < 0.001$ to Suffolk x Tsigai, 6.29 ± 0.22 kg, $p < 0.01$ to German Blackface x Tsigai vs. 5.16 ± 0.25 kg to Tsigai breed). Also, higher values ($p < 0.01$) were recorded to cross lambs regarding the cutlet (3.26 ± 0.06 kg to Suffolk x Tsigai, 3.08 ± 0.03 kg to German Blackface x Tsigai) compared to the mother breed (2.72 ± 0.09 kg).

Keywords: Tsigai sheep, Romania, average daily gain, carcass qualities

Zusammenfassung

Verbesserung der Fleisch- und Schlachtkörperqualtität von Lämmern der rumänischen Schafrasse Tsigai durch die Einkreuzung von Hochleistungsrassen

Tsigai-Schafe sind mit 18 % die zweitwichtigste Schafrasse in Rumänien. Diese robuste Rasse wird traditionell in extensiver Form in den gebirgigen Regionen des Landes gehalten, in der 24 % aller Weidegebiete Rumäniens zu finden sind. Die Leistungen dieser Rasse sind nur begrenzt konkurrenzfähig mit Hochleistungsrassen. Gebrauchskreuzungstiere sind eine Möglichkeit, die Rasse zu erhalten und trotzdem produktiv zu wirtschaften. Der F1-Heterosis-Effekt wird dabei ausgenutzt.

In einem 100-Tage-Fütterungsversuch wurden Kreuzungslämmer Suffolkschaf x Tsigai-Schaf, Deutsches Schwarzkopfschaf x Tsigai-Schaf und reinrassige Tsigai-Schafe in ihren Tageszunahmen und Schlachtkörperqualitäten miteinander verglichen. Die Lämmer wurden unter gleichen Bedingungen gehalten, erhielten das gleiche Futter während der gesamten Versuchszeit. Zum Mastende hatten die Kreuzungstiere significant höhere Lebendgewichte (Suffolk x Tsigai: 23,83 ± 0,67 kg ($p < 0,001$), Deutsches Schwarzkopf x Tsigai ($p < 0,01$): 22,62 ± 0,49 kg als reinrassige Tsigailämmer: 20,11 ± 0,56 kg). Auch das Ausschlachtgewicht war mit 2,5 % ($p < 0,001$) bzw. 2 % ($p < 0,001$) höher.

Jeweils fünf Schlachtkörper wurden auf Schlachtkörper- und Fleischqualitäten hin untersucht. Auch hier hatten die Kreuzungslämmer mehr Fleischanteil. So waren die Keulen von Suffolk x Tsigai mit 6,65 ± 0,09 kg ($p < 0,001$) schwerer als die von Deutschen Schwarzkopf x Tsigai ($p < 0,001$) und reinrassigen Tsigailämmern (5,16 ± 0,25 kg). Ähnliche Unterschiede gab es beim Rückenmuskel (3,26 ± 0,06 kg ($p < 0,01$); 3,08 ± 0,03 kg ($p < 0,01$); 2,72 ± 0,09 kg) und dem gesamten Anteil wertvoller Körperteile.

Schlüsselwörter: Tsigai Schafe, Rumänien, Tageszunahmen, Schlachtkörperqualitäten

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Introduction

Romania has 8,469,000 heads of ewes, currently holding 4th place in Europe after Great Britain, Spain and Greece (FAO 2010), the sheep numbers increased by 10.30 %. compared to 2007. The Turcan race holds the highest share in the breed structure, followed by the Tsigai breed, both being rustic breeds, which are kept on large areas of pastures in mountain and submountain regions (24 % of the total pastures of Romania are located in these areas).

The local sheep breeds are optimally adapted to the environmental conditions. The Tsigai breed is a rustic breed, with a distinct degree of mobility, with high resistance to disease and weather, and is not very susceptible to technological environment conditions.

After 1990, the orientation of sheep rearing in Romania was changed to meat and/or milk production, and this tendency is expected to be continued in the future years (Pădeanu, 2008; Dărăban, 2008).

The main way to rapidly improve the growing speed, meat quality and milk production is the crossbreeding of the local sheep breeds (Turcana, Tsigai and Merino) with specialized sheep breeds for milk or meat production (Dărăban, 2008; Dragomirescu, 2007; Pădeanu et. al., 2008). For this purpose the professional associations of sheep breeders from Romania, as well as the specialized universities and research centres, imported female and male sheep specialized in milk and meat productions from different European countries for reproductive purposes during the last 10 years. We can mention the import of the meat breeds as: Charolais in the Arad – Timi areas; Hampshire in Cluj; Texel in Dobrogea area; and Bluefaced in Timi , Reghin and Bacău.

For milk production we note the import of Sard males and females in the Banat area and milk Belgian rams brought for experimental purposes by the University of Agricultural Sciences and Veterinary Medicine Cluj – Napoca.

These imports show the reorientation of the sheep breeders from mixed production towards the unidirectional productions in a first stage, followed by their specialization within a short time according to European and world orientation (Dărăban, 2008).

Besides their importance for nature conservation, agreed to at the Rio Convention (1992), signed by Romania, the races have historical and cultural importance. Using the crossbreeding between local Tsigai breed with specialized breeds for meat production presents a double advantage. The economic advantage resulting from this crossing is doubled by the advantage of maintaining animal genetic resources, because of the need to maintain parts of sheep flocks with pure breeds.

Material and method

The intensive fattening experiment developed over a 100-day time period was performed on young Tsigai male sheep (lot 1), Suffolk x Tsigai (lot 2), and German Blackface (noted GCCN) x Tsigai (lot 3) male young sheep, obtained at the Reghin Research and Development Station for Sheep and Goats in Mures County in 2007. The age of the Tsigai young sheep at the beginning of the fattening phase was 59 days, and 61 days at Suffolk x Tsigai and GCCN x Tsigai, respectively. The experimental groups were formed with 12 heads each. The fattening period comprised three phases: adaptation phase of 15 days, breeding-fattening phase of 65 days and finishing phase of 20 days. The animals groups were fed *ad libitum* with unique feed in three daily meals at 7:00, 13:00 and 19:00 for all groups. Water and salt were at discretion. The unique fodder was formed of combined fodder and lucerne hay in the case of adaptation phase; combined fodder, lucerne hay and hill hay in the case of breeding-fattening phase; combined fodder, corn flour and hill hay in the finishing phase. The combined fodder was purchased from SC ABOMIX Company. Its chemical composition is presented in Table 1.

Table 1:

Chemical composition of combined fodder used in preparation of unique fodder

Characteristic	Composition
Dry matter. - %	89.74
Crude protein- %	15.08
EM Mcal /kg	3.1
Crude fat - %	1.58
Crude cellulose - %	7.18
Lysine - %	0.66
Methionine - %	0.33
Methionine + cystine - %	0.30
Calcium - %	1.09
Phosphorus - %	0.37
Natrium - %	0.29
Vitamin A - UI	6 700
Vitamin D3 - UI	1 340
Vitamin E – mg/kg	14

Structure of single fodder used during the fattening period is presented in Table 2. For the calculation of dry matter, crude protein and metabolizable energy of alfalfa, hill hay and corn flour were used standard tables of feed nutrient value.

At the end of the fattening phase, 5 heads of each group were slaughtered, and carcass traits were recorded.

During the fattening period, the following parameters were determined in the three groups: body weight at the beginning and in the end of each fattening phase, total body weight gain and average daily weight gain, dry matter intake and specific consumption. To determine dry matter intake (DMI) and specific consumption, the daily offers and leftovers were quantified during all experimental periods.

Table 2:

Structure of single fodder used in fattening experiment with lambs of three genotypes

Item	Fattening phase		
	Adaptation	Breeding-fattening	Finishing
Combined fodder (%)	75.0	70.0	55
Lucerne hay (%)	25.0	30.0	-
Hill hay (%)	-	10.0	10
Corn flour (%)	-	-	35
Dry matter/kg single fooder	86.0	87.0	87.0
Crude protein g/kg dry matter	174.0	149.0	138.0
ME Mcal/kg dry matter	3.1	3.1	3.7

The following parameters were recorded in slaughtered young sheep: live weight before slaughter, cold carcass weight, warm carcass weight, hot, cold and commercial slaughter yield, the weight of the main carcass parts (gigot, cutlet, shoulder + arm, carcasses rest) and conformational traits of the carcass (lengths, widths, depths).

The statistical analysis carried through with aid of the Winstatistical program, and statistical interpretation data was done based on Student test.

Results

The average daily weight gain and the fodder specific consumption are the most important growing parameters which influence the biological and economical growing efficiency in fattening young sheep.

In Table 3 the dynamics of the body weight are presented, as are total weight gain and average daily weight gain of the male young sheep during the fattening period of 100 days (01.05.2007 – 08.08.2007).

The average weight in the beginning of the fattening phase was of 16.61 kg in Tsigai, 17.31 kg in Suffolk x Tsigai and 17.26 kg in GCCN x Tsigai. The difference of 0.70 kg in advantage of the Suffolk x Tsigai and 0.65 kg in advantage of the GCCN x Tsigai is statistically not significant ($p > 0.05$).

During the three fattening phases, there were significant differences ($p < 0.05$) between Tsigai breed and groups of crossbreds in the adaptation phase, and in growing-fattening phase significant differences ($p < 0.01$) were recorded between Groups 1 and 2, and between Groups 1 and 3, respectively ($p < 0.05$).

At the end of the fattening phase, Suffolk x Tsigai recorded an average weight of 41.14 kg, GCCN x Tsigai 39.88 kg, and Tsigai young rams 36.78 kg. The difference of 4.42 kg between Groups 1 and 2 is statistically significant ($p < 0.001$). Also, the difference of 3.16 kg between Groups 1 and 3, is significant ($p < 0.01$).

Average daily gain recorded in fattening phases and the total fattening period is presented in the Table 4. The data table reveals that the crossbred groups have a greater potential for meat production.

Obtaining relatively low average daily gains during the accommodation phase can be attributed to the weaning crisis, reduced duration of phase (only 15 days), and accommodation of fattening technology. The three lots included in the experiment are recorded statistically significant differences ($p < 0.001$) between Groups 1 and 3, and between Group 1 and Group 2 respectively ($p < 0.01$).

In the growth-fattening phase there were no significant differences ($p > 0.05$) between groups of animals about average daily gain.

Appreciable difference, but not spectacular of 25.1 g/day between Groups 1 and 2, and 12.60 g/day between Groups 1 and 3 show the same similarity confirmed by other authors, and say that a protein level around 15 % crude protein is recommendable the lambs of Tsigai breed

Table 3:

The dynamics of the body weight in male young sheep during fattening (mean ± SEM)

Breed/Crossbreed (n=12)	Weight in the beginning of fattening (kg)	End of adaptation phase (kg)	End of the growth - fattening phase (kg)	Weight in the end of finishing (kg)	Total gain (kg)
Tsigai	16.61 ± 0.38	18.78 ± 0.50	33.22 ± 0.97	36.72 ± 0.78	20.11 ± 0.56
Suffolk x Tsigai	17.31 ± 0.38NS	20.62 ± 0.43*	36.69 ± 0.52**	41.14 ± 0.50***	23.83 ± 0.67***
GCCN x Tsigai	17.26 ± 0.37 NS	20.50 ± 0.49*	35.76 ± 0.52*	39.88 ± 0.64**	22.62 ± 0.49**

Note: Student test: NS = not significant ($p > 0.05$); * = significant ($p < 0.05$); ** = distinctly significant ($p < 0.01$); ***= very significant ($p < 0.001$).

(Călătoiu et al., 1977), while the lambs obtained from specialized breeds for meat production or crossbreed, need a higher protein level, situated at around 17 % (Călătoiu A., 1986).

In the finishing phase, the difference (d) of 47.5 g between Groups 1 and 2 is statistically significant ($p < 0.01$). Between Groups 1 and 3, although the absolute difference recorded is 31 g/day, due to high variability, the difference is insignificant ($p > 0.05$). It appears that during finishing phase, with increasing age of lambs, decrease the average daily gain comparative to growing-fattening period, with 47 g of the Tsigai breed, 25 g at Suffolk x Tsigai and 29 g at GCCN x Tsigai.

(source: National Meteorological Administration - Ministry of Environment and Sustainable Development). The values observed are within the range recommended for the NRC (1985), for this animal category, which varies from 1,0 to 1,3 kg/day (for the first two fattening periods, where the live weight of animals varies from 18,78 to 36,69 kg). For the last fattening period (20 day), voluntary dry matter intake is under norms for the NRC (1985).

Recovery feed capacity depends on a number of hereditary and environmental factors. Among hereditary factors, the race, sex, age, individuality play an important role, and of the environmental factors, the energy-protein level of the food, feed structure (single fodder) and mode of administration influence the results of young sheep submitted to intensive fattening.

Table 4:
The dynamics of the average daily gain (ADG) in male young sheep during fattening (mean ± SEM)

Breed/ Crossbreed (n=12)	**Adaptation (15 days)**	**Growth-fattening (65 days)**	**Finishing (20 days)**	**Average daily gain of total fattening (100 days)**
Tsigai	144.60 ± 11.36	222.30 ± 12.62	175.00 ± 11.29	201.10 ± 6.83
Suffolk x Tsigai	220.60 ± 17.88**	247.40 ± 8.29 NS	222.50 ± 7.88**	238.30 ± 2.35***
GCCN x Tsigai	215.90 ± 13.19***	234.90 ± 4.46 NS	206.00 ± 13.83 NS	226.20 ± 4.70**

Note: Student test: NS = not significant ($p > 0.05$); ** = distinctly significant ($p < 0.01$); *** = very significant ($p < 0.001$).

Table 5:
Daily dry matter intake (DMI), ME (metabolizable energy) and CP (crude protein) during fattening period

Fattening phases	**Genotypes**								
	Tsigai			**Suffolk x Tsigai**			**GCCN x Tsigai**		
	DMI kg/ animal	Mcal ME/ kg animal	Crude protein g/animal	DMI kg/ animal	ME MJ/ animal	Crude protein g/animal	DMI kg/ animal	ME MJ/ animal	Crude protein g/animal
Adaptation	0.91	2.8	158.9	1.08	3.4	187.56	1.07	3.4	187.42
Breeding-fattening	1.20	3.7	179.87	1.21	3.7	180.61	1.21	3.7	180.13
Finishing	0.95	3.5	131.53	1.02	3.7	140.05	0.97	3.6	133.28

Concerning average daily weight gain, the differences between the average values of lambs from the crossbreeding and those of Tsigai breed are statistically significant ($p < 0.001$) between Group 1 and Group 2, and between Group 1 and Group 3 ($p < 0.01$).

The values obtained regarding daily dry matter intake, metabolizable energy and crude protein are given in Table 5. The data table shows that in the growth-fattening phase the highest dry matter intake was recorded, with values very close between the three groups. Lower dry matter intake recorded in the finishing phase can be explained by the fact that this experience was made in 2007 (finishing phase ranged last decade of July and first decade of August), a year characterized by very high temperature, being the warmest year in the last 107 years

The evolution of specific consumption (SC) of feed throughout the fattening period has a major importance in the sense that the economic efficiency of fattening is dependent on this indicator.

The evolution of specific consumption (SC) of feed at all stages of fattening and total fattening period are shown in Table 6.

Compared to the fattening phases, it is noticed that in the adaptation phase the highest protein consumption was recorded in all groups and in finishing stage, the highest energy consumption. High values of specific consumption in finishing phases can be explained by the fact that summer 2007 was very dry, with high maximum temperatures, which led to reduction in the feed recovery.

Table 6:
Evolution of specific consumption (SC) on fattening phases

Item	Specific consumption – Genotypes					
	Tsigai		Suffolk x Tsigai		GCCN x Tsigai	
	ME Mcal/kg gain	Crude protein g/gain	ME Mcal/kg gain	Crude protein g/gain	ME Mcal/kg gain	Crude protein g/gain
Accomodation	19.6	1098.38	15.2	850.0	15.5	867.70
Breeding-fattening	16.5	809.67	14.9	750.53	15.7	767.27
Finishing	19.8	751.63	16.6	629.46	17.4	647.01
Total fattening	17.4	830.72	15.3	728.25	15.9	759.75

The highest potential for meat production, with the lowest specific consumption (SC) it holds of Suffolk x Tsigai group, followed very closely by GCCN x Tsigai crossbreed. In less improved breeds from Romania (Tsigai, Turcana), the conversion degree of fibrous feed in meat production is greater than in improved breeds that have higher nutrient requirements, are early, and are more demanding with the food quality meaning they require higher proportions of concentrates in the ration (Călătoiu A., 1986).

Degree of food balancing in nutrients is the substrate material of growth, development and fattening, directly influencing the growth rate and default, index of feed conversion and finished product quality.

Single feed used in the experiment was well balanced and assured animal nutrient requirements, compared to known international standards for the growing and fattening of young lambs (NRC, 1985).

The average values and differences concerning body weight before slaughter, hot and cold carcass weight, hot, cold and commercial slaughter yield are presented in Table 7.

Thus, Suffolk x Tsigai has realized an average slaughter weight of 40.83 kg, and GCCN x Tsigai 39.68 kg, while Tsigai young sheep achieve 36.80 kg. The differences recorded are significant between Lots 1 and 2 ($p < 0.001$) and between Lots 1 and 3 ($p < 0.01$).

The warm carcass weight in crossbreed and Tsigai breed recorded average values of 19.80 kg at Suffolk x Tsigai, 19.04 kg at GCCN x Tsigai and 16.95 kg at Tsigai breed, with significant difference (+2.85 kg, $p < 0.001$) to the advantage of the Suffolk x Tsigai and GCCN x Tsigai (+2.09 kg, $p < 0.01$). Also, significant differences ($p < 0.01$) between a group of Suffolk x Tsigai (+2.92 kg) and GCCN x Tsigai (+2.10 kg) were recorded regarding the cold carcass weights compared with the Tsigai breed. The differences were in favour of crossbreed lots.

Regarding the hot, cold and commercial slaughter yield, significant differences ($p < 0.001$) were recorded between crossbreed lots and the Tsigai breed, the differences being to the advantage of crossbreed lambs.

Concerning the gigot, cutlet, shoulder + arm and carcass rest, the result are presented in Table 8.

The crossbreed lots recorded greater average values compared to the Tsigai pure breed, with differences of 1.49 kg, 0.54 kg, 0.61 kg and 0.28 kg, respectively to Suffolk x Tsigai, with significant differences regarding the gigot ($p < 0.001$), cutlet ($p < 0.01$) and shoulder + arm ($p < 0.01$). The differences were to the crossbreed advantage. The values obtained for the GCCN x Tsigai were also higher compared to the Tsigai breed, the differences recorded were significant for gigot (1.13 kg, $p < 0.01$),

Table 7:
The mean values of the carcass weight and slaughtering yield

Breed/ Crossbreed (n=5)	Trait					
	WBS (kg)	HCW (kg)	CCW (kg)	HSY (%)	CSY (%)	CY (%)
Tsigai	36.80	16.95	16.56	46.06	45.00	49.27
Suffolk x Tsigai	40.83***	19.80***	19.48**	48.49 ***	47.71***	51.92 ***
GCCN x Tsigai	39.68 **	19.04**	18.66**	47.98***	47.03***	51.23 ***

Note: WBS-Weight before slaughtering; HCW-Hot carcass weight; CCW-Cold carcass weight; HSY – Hot slaughter yield; CSY – Cold slaughter yield; CY – Commercial yield;
Student test: ** = distinctly significant ($p < 0.01$); *** = very significant ($p < 0.001$).

Table 8:
The main cut sections of carcass from young rams submitted to intensive fattening (mean ± SEM)

Genotypes (n=5)	Trait				
	Cold carcass weight (kg)	Gigot (kg)	Cutlet (kg)	Shoulder + arm (kg)	Carcass rest (kg)
Tsigai	16.56 ± 0.44	5.16 ± 0.25	2.72 ± 0.09	2.94 ± 0.13	5.74 ± 0.15
Suffolk x Tsigai	19.48 ± 0.27**	6.65 ± 0.09***	3.26 ± 0.06**	3.55 ± 0.04**	6.02 ± 0.06 NS
GCCN x Tsigai	18.66 ± 0.38**	6.29 ± 0.22**	3.08 ± 0.03**	3.43 ± 0.12*	5.86 ± 0.08 NS

Note: Student test: NS=not significant (p > 0.05);*=significant (p < 0.05); ** = distinctly significant (p < 0.01);***= very significant (p < 0.001).

Table 9:
Carcass conformation traits in slaughtered young rams (mean ± SEM)

Trait	Genotypes		
	Tsigai (n=5)	Suffolk x Tsigai (n=5)	GCCN x Tsigai (n=5)
Big length of the carcass (cm)	71.22 ± 0.11	72.43 ± 0.48*	74.12 ± 0.67**
Small length of the carcass (cm)	61.53 ± 0.09	62.31 ± 0.26***	63.36 ± 0.28***
Width at shoulders (cm)	18.62 ± 0.19	20.30 ± 0.18***	20.21 ± 0.16***
Width at thorax (cm)	25.65 ± 0.24	27.16 ± 0.26**	26.72 ± 0.27*
Width at gigot (cm)	19.81 ± 0.19	21.33 ± 0.27**	21.54 ± 0.49*
Deep of the thorax (cm)	26.69 ± 0.48	29.80 ± 0.52**	28.55 ± 0.46*
Thorax perimeter (cm)	71.63 ± 0.59	74.56 ± 0.24**	74.82 ± 0.16***
Gigot perimeter (cm)	42.20 ± 0.64	48.78 ± 0.58***	46.92 ± 0.49***
Gigot length (cm)	23.82 ± 0.49	23.96 ± 0.38 NS	25.33 ± 0.33*

Note: Student test: NS = not significant (p > 0.05); *= significant (p < 0.05); ** = distinctly significant (p < 0.01); *** = very significant (p < 0.001).

cutlet (0.36 kg, $p < 0.01$), and shoulder + arm weight (0.49 kg, $p < 0.05$).

Presented in Table 9 are the average values and variability estimates for the carcass conformational traits of the slaughtered young male sheep.

In all analyzed traits, the crossbreed groups recorded greater average values compared to the Tsigai breed. Statistically significant differences ($p < 0.001$) between Suffolk x Tsigai, GCCN x Tsigai lots and Tsigai breed were recorded in small length of the carcass (62.31 ± 0.26 cm to Group 2, 63.36 ± 0.28 cm to Group 3 vs. 61.53 ± 0.09 cm to Group 1), width at shoulders (20.30 ± 0.18 cm to Suffolk x Tsigai, 20.21 ± 0.16 cm to GCCN x Tsigai vs. 18.62 ± 0.19 cm to Tsigai breed) and gigot perimeter (48.78 ± 0.58 cm to Group 2, 46.92 ± 0.49 cm to Group 3 vs. 42.20 ± 0.64 cm to Group 1). Also, significant differences were recorded between GCCN x Tsigai and Tsigai breed regarding the thorax perimeter (74.82 ± 0.16 cm vs. 71.63 ± 0.59 cm, $p < 0.001$).

Significant differences ($p < 0.01$) were recorded between Suffolk x Tsigai crossbreed and Tsigai breed in width at thorax (+1.51 cm), width at gigot (+1.52 cm), deep of the thorax (+3.11 cm) and thorax perimeter (+2.93 cm), and between GCCN x Tsigai and Tsigai breed in big length of the carcass (+2.90 cm). The differences are in favour of crossbreed lots.

Significant differences ($p < 0.05$) between GCCN x Tsigai and Tsigai breed were recorded in width at thorax (+1.07 cm), width at gigot (+1.73 cm), deep of the thorax (+1.73 cm) and gigot length (+1.51 cm). Between Suffolk x Tsigai and Tsigai breed significant differences were recorded in big length of the carcass (+1.21 cm).

Conclusions

1. The growth and development dynamics of young sheep from the three types of breeds subjected to intensive fattening highlights a higher potential of meat production in Suffolk x Tsigai and GCCN x Tsigai cross breeds, compared with the Tsigai breed.
2. For conformational carcass traits, the crossbreeds Suffolk x Tsigai and GCCN x Tsigai show longer and larger carcasses compared with Tsigai breed, which approaches the carcass format of meat breeds.
3. Because the F1 crossing effect will not remain on a national level, the Tsigai breed may be added in a plan

to create a local type, characterised by high indices of meat production, by crossings with specialised breeds in this direction.

4. The Tsigai breed was improved towards meat production in pure breed growth. A national programme (EU funded) could help to preserve local breeds through crossbreeding.

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