GROWTH AND CARCASS PERFORMANCE OF PUREBRED BELGIAN TEXEL RAMS TESTED IN STATION.

Session IV, 221-222, G5.29, 40th annual meeting of the EAAP, August 27-31, Dublin

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ABSTRACT

Belgian Texel lambs, progenies of 14 rams have been tested at the experimental station farm of the Université de Liege in 1987 (n=62) and in 1988 (n=87).
During the testing period the animals were fed with concentrates and straw. At the end of the fattening period a conformation score was given and growth and carcass parameters including the dressing out percentage were examined.
The results indicate that within the Belgian Texel breed, "double muscled" animals differ from conventional ones by higher dressing out percentage values (>50%), a shorter and a more compact carcass. Due to the increase in muscular tissue (and the decrease in fatness) the animals are in high grade categories (+ 10-15 Belgian francs /kilo - 10 Belgian francs = 0.25 $ US).
In 1988, 20 paternal halbsibs of the same age (10 of the Texel breed, 10 of the Bleu du Maine breed) were studied in more detail. The depth of the *Longissimus dorsi* (L4 level) was measured by echography during the testing period. Blood samples were taken and a commercial cut followed by a dissection of the L4 rib were realized.
The Texel rams had significantly higher value of plasma creatinine and depth of the Longissimus dorsi. The commercial cut is in favour of the Texel who has heavier, lower fat and bone content carcasses. The muscular development is important in the saddle and the legs.
The development of the *Longissimus dorsi* is very important at the lumbar region (Texel: mean of eye muscle weight = 53gr, Bleu du Maine: mean of eye muscle weight = 43gr).
(Key words: Sheep, Growth, Carcass, Texel)

Introduction

Recent developments in sheep production in Europe illustrate the need for meaty type animals and low fat content and minimum bone carcasses.
In order to achieve these objectives terminal sire breeds have been compared and earlier slaughtering, reduced carcass weight have been observed (Kempster et al. 1987a and 1987b).
The Belgian-type Texel is considered as a meaty type breed and some animals of the breed are so extreme in conformation that they can be compared to double muscling in cattle.
Texel rams are also used in crossbreeding and the Belgian-type can be considered as a terminal sire line. This paper presents the results of the progeny testing scheme initiated in 1987 by the Commission Wallonne de Promotion Ovine.

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Material and methods

The material consists of 149 male lambs tested in the research station farm of the Veterinary College of the University of Liege. The lambs, progenies of 14 rams, have been tested during 1987 (n=62) and 1988 (n=87).
The distribution of lambs by year and month of entrance in the station and sire is given in table 1.
Animals were also divided according to their conformation: meaty and conventional (table 1).
The day before slaughter blood samples were taken and creatinine and creatine concentrations were determine by the method of Eggleton et al. (1943) and Owen et al. (1954) respectively.
During the testing period of 1988, 20 lambs (10 purebred Bleu du Maine and 10 purebred Texel) were also compared from weaning to slaughter. A commercial cut and a dissection of the 4th lumbar rib have been realized on each animal four days after slaughter.
During the testing period all the lambs, grouped according to the sire, received concentrate feeding (13% protein) and straw. They were slaughtered at different weights according to the fattening condition.
During the fattening period animals were grouped in pens of ten. Consumption was recorded for each group of progenies and mean consumption was assigned to each animal.
Daily gain in station was measured as the total gain in station divided by the corresponding length of the fattening period. The feed conversion ratio was estimated for each lamb as the average consumption of concentrate of each progeny group divided by the total gain in station.
Data were analyzed by linear fixed models including initial age, initial weight, final age, final weight, year, sire nested within years and linear models including year, sire nested within year and initial weight and final weight as covariables.

Results

The means and standard deviations of growth and carcass parameters are given in table 2 for the whole material. Corresponding values are given in table 3 for conventional and for meaty animals. Meaty animals have heavier and shorter carcasses, a better dressing out percentage and a thinner skin. Carcass prices of the meaty animals are in average 11.4 Belgian francs/kilo higher than conventional.
Linear models including: initial age, initial weight, final age, final weight, year and sire nested within years explained 79.2% of the variation of feed conversion and 88.7% of the variation of daily gain. The effect of age (initial and final) on daily gain and feed conversion was not significant. Linear models including: year and sire nested within years, initial weight and final weight as covariables, explained 88.1% of the variation of feed conversion and 91.8% of the variation of daily gain. Reduction of sum of squares and corresponding determination coefficients (table 4) indicate that year and sire effect within years explain nearly 55% of the variation of daily gain and feed conversion. Sire effect is important but it includes other effects as: flock, fattening period (the same for each progeny group).
Final weight influences more feed conversion than daily gain; the influence of initial weight is similar but the values of the coefficient of determination are lower (table 4). The Texel and Bleu du Maine are compared in tables 5 and 6.
The commercial cut (table 5) indicates that Telexes have more muscle especially in the legs, saddle, loin, less fat and bone (not significant). The depth of the *Longissimus dorsi*, measured by echography in the lumbar region, illustrates the development of the eye muscle in Texel.
The dissection of the 4th lumbar rib shows the advantage of the Texel breed: more meat, less bone and fat (not significant). Most of the muscle development was observed in the eye muscle. The weight of the *Psoas* major was greater in the Bleu du Maine but this could be due to a longer carcass.

Creatinine and creatine levels and creatinine/creatine ratios of the two breeds were significantly different. The joint distribution of the creatinine and creatine plasma levels is given in figure 1 for the Texel and Bleu du Maine. In figure 1, Bleu du Maine rams occupy a position corresponding to lower muscular development. When comparing conventional and meaty Texel, the plasma creatinine levels only were significantly different.

Discussion

This first study on Belgian Texel illustrates the main non genetic factors influencing daily gain and feed conversion and indicates the environmental effects to be included in the linear models used to estimate breeding values.
As mentioned by Visscher and Bekedam (1984) only a few experiments give relevant information on growth rate and development of the Texel. In The Netherlands Verschuyl (1944) was the first to study the breed. He was followed by Beukeboom (1976) and Visscher(1978) who have compared two lines of Texel selected for post-weaning growth until 47Kg live weight.
In our results the average daily gain (whole material) is 232gr per day which is comparable to those published by the authors cited above. Results found in the literature concern generally the Texel as sire breed. When used in crossbreeding, Texel shows average daily gain close to 300gr per day (Bouix 1984, Wolf et al. 1980, Cameron and Drury 1985, Nitter 1975).
Feed intake was not measured individually but by progeny group.
Our feed conversion results were not comparable with those of Visscher (1978) cited by Visscher and Bekedam (1974) where the animals were fed with hay and concentrate.
The carcasses of Texel are more compact and shorter with higher values of the dressing out percentage as it is observed in the Belgian Blue cattle breed and the Pietrain pig.
Results of the commercial cut and the dissection illustrate the advantage of the Texel. The results are to be compared with those of Kempster et al. 1987a and 1987b, Wolf 1982 and Wolf et al. 1980 for the Texel used as terminal sire.
Creatine and creatinine concentrations illustrate also the muscular development of the Texel but the variation within the Texel breed is different from the variation obtained by Hanset and Michaux (1986) in the Belgian Blue cattle where very high values of plasmatic creatinine (>3000 gamma /100 ml) and very low values of plasmatic creatine (<600 gamma/100 ml) were recorded for double muscled animals. Nevertheless plasmatic creatinine and creatine discriminate quite well extreme muscle type animals from the others. The values are similar to the results obtained by Ansay and Olivier 1978 in the Pietrain pig breed.
Some animals of the Texel breed are so extreme that they could be compared to double muscled animals of other species. However fat content of the carcass and creatinine and creatine levels indicate that, if the muscular development is important in some Texel, the difference observed with conventional animals is less important than in the Belgian Blue cattle.

Table 1 Distribution of the 149 lambs by year and month of entrance in the station and sire.

PERIOD	FREQUENCY	PERCENT	Year-Month
87 07	30	20.1	
87 08	32	21.5	
88 06	9	6.0	
88 07	59	39.6	
88 08	19	12.8	
SIRE			
ixor	9	6.0	
jamin	20	13.4	
nl-01127	9	6.0	
MA.3247	10	6.7	
MERRE	9	6.0	
100	10	6.7	
4W1606	10	6.7	
4080.083	10	6.7	
83b1693	10	6.7	
8510138	10	6.7	
8515555	9	6.0	
86	10	6.7	
92	10	6.7	
98	13	8.7	
CONFORMATION			
Conventional	121	81.2	
Meaty	28	18.8	

Table 2. Mean and standard deviation of birth weight(BW), initial age(IA), initial weight(IW), final age(FA), final weight(FW), fattening period(FAT_PER), consumption(CONS), total gain(TOT_GAIN), average daily gain station(ADG), feed conversion ratio(FCR), carcass weight(CAR_WGHT), carcass length(CAR_LGTH), carcass price(CAR_PRICE), dressing out % (DO_%), viscera(VISC), heart and lung(HEA_LUNG)-(Underlined characters are significantly.- Whole material (n=149)

	MEAN	STANDARD DEVIATION
BW	3.648	0.558
IA	118.396	17.007
IW	30.802	4.989
FA	196.383	38.173
FW	47.330	4.888
FAT_PER	77.987	34.696
CONS	1.367	0.169
TOT_GAIN	16.528	6.364
ADG	0.228	0.068
FCR	6.413	1.774
CAR_WGHT	23.852	3.098
CAR_LGTH	74.053	3.578
CAR_PRICE	178.817	6.934
DO_P	50.326	2.986
SKIN	6.329	1.024
VISC	9.949	1.593
LIVER	0.889	0.136
HEA_LUNG	0.906	0.172
TESTIS	0.394	0.102
HEAD	2.333	0.359

Table 3. Mean and standard deviation of birth weight(BW), initial age(IA), initial weight(IW), final age(FA), final weight(FW), fattening period(FAT_PER), consumption(CONS), total gain(TOT_GAIN), average daily gain station(ADG), feed conversion ratio(FCR), carcass weight (CAR_WGHT), carcass length(CAR_LGTH), carcass price(CAR_PRICE),dressing out %(DO_%), viscera(VISC), heart and lung(HEA_LUNG)-(Underlined characters are significantly different).-(Underlined characters are significantly different).

	Conventional (n=121)		Meaty (n=28)	
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION
BW	3.649	0.556	3.643	0.575
IA	117.545	17.542	122.071	14.160
IW	30.400	5.233	32.539	3.299
FA	197.372	40.943	192.107	22.667
FW	47.241	5.203	47.711	3.237
FAT_PER	79.826	36.730	70.036	22.848
CONS	1.361	0.164	1.393	0.188
TOT_GAIN	16.841	6.790	15.171	3.845
ADG	0.228	0.068	0.232	0.069
FCR	6.430	1.848	6.338	1.437
CAR_WGHT	23.594	3.188	24.968	2.417
CAR_LGTH	74.320	3.739	72.964	2.610
CAR_PRICE	176.735	5.763	188.148	2.824
DO_%	49.872	2.842	52.287	2.843
SKIN	6.454	1.010	5.789	0.917
VISC	9.944	1.698	9.973	1.046
LIVER	0.875	0.134	0.946	0.133
HEA_LUNG	0.913	0.174	0.879	0.168
TESTIS	0.396	0.097	0.386	0.125
HEAD	2.330	0.376	2.345	0.278

Table 4. Results of the analysis of variance including the effects of initial age(IN_AGE), initial weight(IW), final age(FI_AGE), final weight(FW), Year and Sire within year for Daily gain and feed conversion.

	IN AGE	IW	FI AGE	FW	YEAR	Sire(YEAR)	R2
Daily Gain Station	n.s.	P<0.001	n.s.	P<0.001	P<0.001	P<0.001	0.887
Feed conversion	n.s.	P<0.001	n.s	P<0.001	P<0.001	P<0.001	0.792

Coefficient of determination(R2*100) due to the effect of initial weight(IW), final weight(FW), Year and Sire within year for Daily gain and feed conversion

	I W	FW	YEAR and Sire(YEAR)	Model covariable
Daily Gain Station	15.7	25.8	53.6	91.8
Feed conversion	29.1	51.1	57.0	88.1

Table 5. Results of the commercial cut of the Texel(n=10) and Bleu du Maine(n=10) lambs tested in the same conditions of the experimental station farm of the University of Liege. (Underlined characters are significantly different).

	T E X E L		B L E U du M A I N E	
(K¡)	Mean	Standard Deviation	Mean	Standard Deviation
SHOULDER (L)	1.655	0.266	1.940	0.212
FLANK (L)	2.590	0.342	1.810	0.212
SHOULDER (R)	1.600	0.221	1.945	0.166
FLANK (R)	2.540	0.341	1.805	0.296
LEG (L)	3.510	0.478	2.955	0.328
LEG (R)	3.545	0.517	2.955	0.338
CHUMP	5.560	1.004	3.645	0.386
FAT (dissected)	0.705	0.535	1.195	0.442
BONE (dissected)	1.445	0.154	1.640	0.403
LOIN	6.830	1.181	5.785	0.522
NECK	1.495	0.287	1.765	0.277
SCRAG	0.125	0.063	0.435	0.170
KIDNEY	0.115	0.034	0.125	0.026
F_W	47.050	5.107	48.030	4.088
CAR_WGHT	25.850	3.520	22.570	1.929
D.O.(%)	54.800	0.025	47.000	0.017
Long.Dorsi (mm)	28.550	5.002	22.500	1.972

F_W (final weight), CAR_WGHT (carcass weight), D.O. (dressing out %)

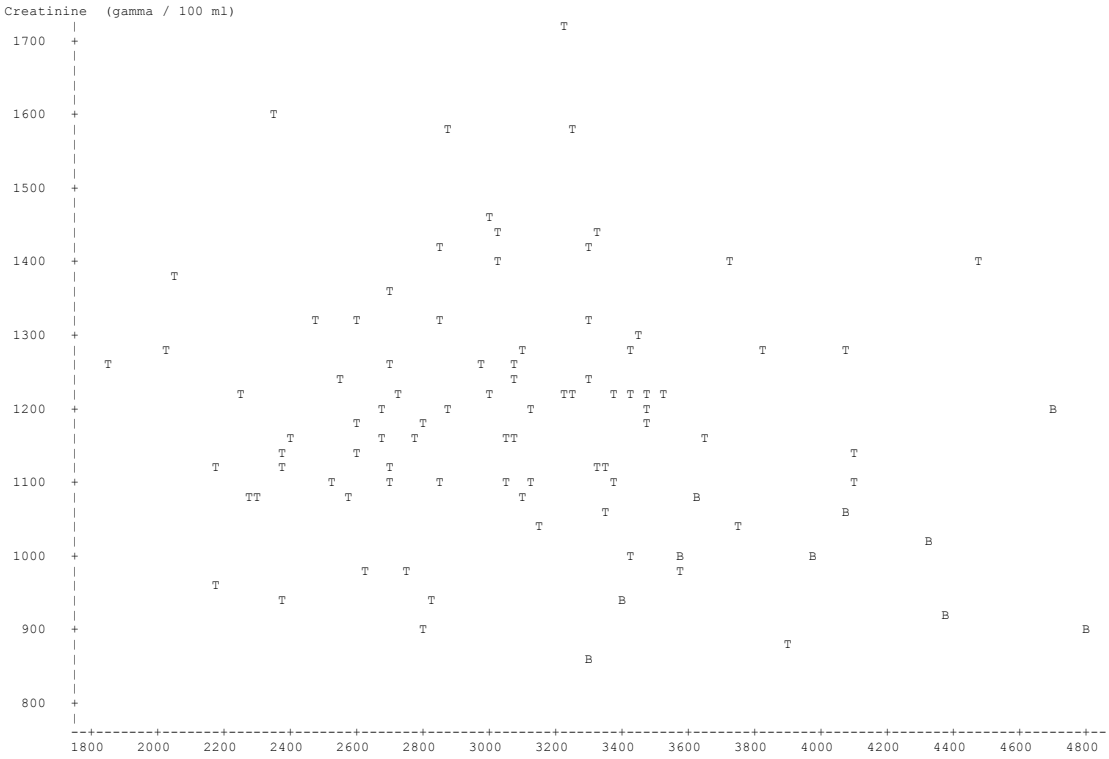
Table 6. Results of the dissection of the 4th rib(lumbar region L4) Texel(n=10) and Bleu du Maine(n=10) lambs tested in the same conditions of the experimental station farm of the University of Liege. (Underlined characters are significantly different).

		T E X E L		B L E U du M A I N E	
VARIABLE	N	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION
Weight	10	229.82	37.4	229.37	29.4
Efficiency	10	72.40	2.5	65.25	4.1
Surf_Eye M.	10	1764.05	323.1	1322.70	115.5
Perim_Eye M.	10	184.95	17.3	169.40	8.4
Eye M.	10	53.48	13.1	43.50	4.9
Psoas Maj.	10	14.06	2.5	16.90	2.3
Psoas Min.	10	5.87	0.8	4.80	0.7
Quad. Lumb.	10	2.77	0.7	2.61	0.5
VERT	10	12.25	2.1	10.59	2.1
Fat	10	21.53	7.4	28.60	14.3
Bone	10	41.40	3.2	51.57	4.7

Table 7. Plasmatic and globular Creatinine and creatine concentrations of Texel(n=84) and Bleu du Maine(n=10) - (Underlined characters are significantly different).

Breed	T E X E L n= 84		B L E U du M A I N E n=10	
VARIABLE	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION
Creatinine P	1206.00	159.23	999.70	97.03
Creatinine G	1091.94	110.29	915.40	92.11
Creatine P	3004.34	522.97	4013.00	532.94
Creatine G	2551.37	281.45	3044.00	306.75

Figure 1.Joint distribution of the creatinine and creatine plasma levels of Texel (T) and Bleu du Maine (B).



Creatine (gamma / 100 ml)

Literature Cited

Ansay M., Olivier L. 1978. Créatinine plasmatique et sensibilité du porc au syndrome de l' hyperthermie maligne - Relations avec deux enzymes du globule rouge (PH I et 6-PGD). Ann. Génét. Sél. Anim, 10, 9-16

Beukeboom, J.A., 1976. Groei en Slachtkwaliteit van Texelse lammeren. Verslag van een rammenselectieproef of Texel (Commissie Rammenselectie proef Texel).

Bouix, J. 1988. Déterminisme génétique des qualités de carcasses des ovins. 3rd World Congress on sheep and beef cattle breeding. Paris 19-23 juin 1988. Vol. 1, 397-413.

Cameron N.D. , Drury D.J ., 1985. Comparison of terminal sire breeds for growth and carcass traits in crossbred lambs .Anim. prod. 40, 315-322 .

Eggleton P., et al. 1943. The estimation of creatine and of diacetyl. Biochem. J. 37, 526-529.

Hanset R., Michaux Ch. 1986. Characterization of biological types of cattle by blood levels of creatine and creatinine. J. Anim. Breedg. Genet. 103, 227-240.

Kempster A.J ., Croston D. , Guy D.R. ,Jones D.W. ,1987a. Growth and carcass characteristics of crossbred lambs by ten sire breeds ,compared at the same estimated carcass subcutaneous fat proportion. Anim. Prod. 44, 83-98

Kempster A.J ., Croston D. , Jones D.W. ,1987b. Tissue growth and development in crossbred lambs sired by ten breeds. Livest. prod. Sci. ,16, 145-162.

Nitter G. , 1975.Results of a crossbreeding experiment with sheep for different systems of fat lambs production. II .Growth and carcass traits. Livest. prod. Sci ., 2, 179-190.

Owen J. et al. The determination of creatinine in plasma or serum, and in urine; a critical examination. Biochem. J. 58, 426-437

Vesrchuyl H., 1974. Verslag van een onderzoek ingesteld naar de gewichtstoename van lammeren van het Texelse shapenras. Maanblad voor de Voorlichtingsdienst, 1, 511-523.

Visscher A.H. ,Bekedam M. ,1984. Influence of the Texel breed on sheep production in Europe . E.A.A.P. : 35th annual meeting. The Hague, 6-9 august.

Wolf B.T. , 1982 .An analysis of the variation in the lean tissue distribution of sheep. Anim. Prod.,34, 257-264.

Wolf B.T. , Smith C. , Sales D. I. ,1980. Growth and carcass composition in the crossbred progeny of six terminal sire breeds of sheep. Anim. Prod. 31, 307-313 .