SUFFOLK VS CANADIAN ARCOTT AS TERMINAL SIRE… A 100 TO 1 FIGHT?

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Article published in 2006 in Sheep Canada

Many would have been ready to bet on the winner of an eventual fight between market lambs coming from either Canadian Arcott or Suffolk rams … The "blacks" having, of course, the support of the majority. But who would have bet right? The Suffolk fans or the braver (should we call them the "gambler") fans of the Canadian Arcott? One thing is sure: the easy victory predicted by the so-called "experts" is far from reality! To everybody's dismay, the match ended with a draw verdict.

In Canada, sheep producers use multiple breeds and crosses to produce market lambs. This makes the production of a consistent quality lamb difficult or almost impossible, even though it is an essential condition to expand the markets. The choice of a breed as terminal sire involves many considerations, often leaded by emotions rather than reason or logic. The need for well conducted studies comparing the many available breeds was unquestionable.

Our research team have tried to find some answers to this tricky question about the choice of a terminal breed sire to produce commercial market lambs. We have compared growth performance, carcass quality and cutability of lambs from Canadian Arcott and Suffolk rams. At the same time, we have also determined the effect of a higher slaughter weight on lambs muscle growth and fat deposition.

In the left-hand corner… In the right-hand corner…

A total of 238 Romanov x Dorset (½RV½DP or ½DP½RV) prolific hybrid ewes were mated to 27 rams (13 Canadian Arcott - CD and 14 Suffolk - SU) on 10 Quebec commercial farms to produce the 128 lambs needed for the experiment. Half of the selected lambs were from a SU terminal sire cross and the other half was from a CD terminal sire cross (as many males as females). The lamb selection was done to get a representative group from each terminal cross (not the best nor the worst). All lambs were weaned at approximately 55 days of age. At about 65 days of age, the lambs were selected on each farm and transported to the La Pocatière commercial lamb test station. A slaughter weight[1] was then allotted to each of the 128 lambs (16 lambs in each weight class for the two genotypes) : 41-44 kg and 46-49 kg for females ; 46-49 kg and

[1] Live weight following a 12h fasting period

51-54 kg for males. Males and females were reared in separate pens. The lambs had ad libitum access to commercial concentrate and hay during the experimental period.

Lambs were weighed weekly and ultrasound measurements were taken at different anatomical sites every two weeks. After slaughtering, the lamb carcasses were split down the midline and the left half-carcass was shipped to the AAC Research Centre in Lennoxville. Those half-carcasses were then separated into primal cuts (shoulder, loin, rack and leg), scanned using dual-energy X-ray absorptometry (DEXA)[2] and then fabricated into retail cuts (trimmed at 6 mm of fat ; shoulder, square-cut shoulder, loin trimmed, rib rack roast ready, leg, partially boneless leg, flank and breast). Statistical analysis of breed effect was evaluated for each sex separately because the slaughter weight classes were different for male and female.

Ding! Ding! Ding! … Let the fight begin!

Differences between ½SU¼RV¼DP (½SU) and ½CD¼RV¼DP (½CD) lambs were minimal (Table 1). ADG were similar for the ½CD and the ½SU lambs for each sex (339 vs. 348 g/d for females and 433 vs. 446 g/d for males). But since the ½SU were slightly heavier at the beginning of the experimental period (and at weaning), they reached slaughter weight at a younger age than the ½CD, about a week earlier, and even less for females. It is difficult to identify the exact cause of this variation in the weaning weights between the two crosses since the environmental factors (management on each farm) and genetic factors (genotype) are confounded. Even if the ½SU seem leaner than the ½CD, the difference was not statistically significant (12.4 vs. 13.9 mm at GR site[3]).

Slaughtering lambs at heavier weights results in an increased age at slaughter (10 and 15 d for males and females, respectively) and, by doing so, a higher fat depth (Table 1). Even when the slaughter weights were lower for females, the increase in fat was more noticeable. The dimensions of the loin eye muscle (area and/or thickness) were enlarged significantly with the increase of weights. In fact, the loin eye muscle area was 1 to 2 cm^2 larger for heavier females and males, respectively. Since the GR is so important in the evaluation of the saleable meat yield[4] (SMY) calculation, heavier carcasses got lower SMY. Still, it must be mentioned that females weighing more than 46 kg obtained average GR measurements of over 18 mm, which is considered excessive.

With regard to the cutability, no significant difference was noted between the two crosses for the weight of primal and retail cuts (Table 2). For males, the estimate of lean meat yield[5] (LMY) gave a slight advantage to the ½SU. But this difference is far from convincing since it is not statistically significant. The retail yield[6] was equal for the ½CD and the ½SU,

[2] The DEXA instruments allows the determination of tissue weights (fat, lean and bone) without having to dissect the animal.

[3] Total tissue depth at the 12th rib, 11 cm from the midline, measured by a grading rule at the slaughterhouse (grading site).

[4] SMY = 78.92 - (0.51 GR) + (1.25 average muscling score) ; Jones et al., 1996. Can. J. Anim. Sci. 76:49-53.

[5] LMY = 65.8 – (0.074 hot carcass weight) - [0.432 (6.38 + 0.88 GR)] ; Jones et al., 1992. Can. J. Anim. Sci. 72:237-244.

[6] Sum of the square cut shoulder, semi-boneless roast, loin and rack roast retail cuts weights trimmed to 6 mm of fat divided by the weight of those same primal cuts (shoulder, leg, loin).

around 80%. This yield has not varied between the two slaughter weights. Indeed, the fat trimming losses are only slightly increased (+ 0.5%) for females and are the same for males. Yet again, LMY estimation credits the lighter carcasses.

And the winner is …

Our study demonstrates that SU- and CD-sired crossbred lambs are very similar for their growth performances. Moreover, no significant difference was noted for carcass quality between crosses.

On the other hand, even if the fat deposition is increased, it appears that the weight of retail cuts (excess fat trimmed) was improved with increasing slaughter weight. But the estimation of LMY decreased in higher slaughter weight. Subsequent analysis on exact carcass composition data (DEXA) should give us more information on the relative importance of the different tissues between breeds and slaughter weight classes.

Consumers ask for cuts with more lean with an optimal fat cover. Lamb carcasses being often too fatty, it is necessary to adapt the lamb production in order to encounter the consumer's demand. Works should be directed towards several aspects of the production as genetic (choice of breed, sire and dam selection…) and management (feeding, slaughter weight…).

Table 1 – Growth performances and carcass quality of male and female lambs according to terminal sire breed and slaughter weight.

VARIABLES	FEMALES				Effects		MALES				Effects	
	½CD		½SU				½CD		½SU			
	41-44 kg	46-49 kg	41-44 kg	46-49 kg	Breed	Weight	46-49 kg	51-54 kg	46-49 kg	51-54 kg	Breed	Weight
Initial age (d)	64.0	64.3	64.5	64.2	NS	NS	63.9	65	64.5	64.7	NS	NS
Initial weight (kg)	21.4	22.1	23.0	23.1	*	NS	22.9	24.6	25.9	26.0	*	NS
ADG (g/d)	337	341	359	338	NS	NS	421	445	452	439	NS	NS
Slaughter age (d)	139.1	149.3	128.8	148.6	0.1	*	133.5	139.1	121.0	136.1	*	*
Backfat thickness[1] (mm)	9.5	10.9	9.1	11.1	NS	*	8.0	9.1	8.7	8.9	NS	*
Loin eye muscle depth[1] (mm)	29.9	30.8	30.6	30.8	NS	NS	30.3	32.0	29.8	31.5	NS	*
Loin eye muscle area[2] (cm^2)	16.7	17.9	16.7	18.0	NS	*	18.4	20.8	18.0	19.4	NS	*
Slaughter weight (kg)	42.2	47.4	42.3	48.2	NS	*	47.2	52.4	47.3	52.8	NS	*
Hot carcass weight (kg)	21.4	24.3	21.3	24.4	NS	*	23.5	26.2	23.2	26.3	NS	*
Dressing percentage (%)	50.6	51.2	50.4	50.6	NS	NS	49.7	50.1	49.0	49.8	NS	NS
GR (mm)	16.4	18.4	13.8	18.4	NS	*	12.9	14.9	11.7	13.2	< 0.1	*
Average muscling score	3.6	3.6	3.5	3.7	NS	NS	3.4	3.4	3.2	3.3	NS	NS
SMY[3] (%)	75.2	74.3	76.3	74.1	NS	*	76.7	75.6	77	76.1	NS	*

* $P < 0.05$ statistically significant effect; NS : Non significant
[1] Backfat and loin eye muscle depth measured by ultrasound, 24 to 48 h before slaughter, between the 3rd and 4th lumbar vertebrae, alongside the midline.
[2] Loin eye area measured on the carcass with a stencil, between the 3rd et 4th lumbar vertebras.
[3] SMY = 78.92 - (0.51 GR) + (1.25 average muscling score) ; Jones et al., 1996. Can. J. Anim. Sci. 76:49-53.

Table 2 – Half-carcass cuts weights and yields for male and female lambs according to terminal sire breed and slaughter weight.

VARIABLES	FEMALES				Effects		MALES				Effects	
	½CD		½SU				½CD		½SU			
	41-44 kg	46-49 kg	41-44 kg	46-49 kg	Breed	Weight	46-49 kg	51-54 kg	46-49 kg	51-54 kg	Breed	Weight
Primal cuts (kg)	10.4	11.8	10.3	12.0	NS	*	11.3	12.8	11.0	12.6	NS	*
Retail cuts (kg)	7.7	8.7	7.7	8.8	NS	*	8.5	9.5	8.3	9.4	NS	*
LMY[1] (%)	55.2	54.3	56.3	54.3	NS	*	56.4	55.4	56.9	56.1	< 0.1	*
Retail yield[2] (%)	80.7	80.7	80.8	79.8	NS	< 0.1	81.2	80.5	80.6	80.3	NS	NS

* P < 0.05 statistically significant effect; NS : Non significant
[1]LMY = 65.8 – (0.074 hot carcass weight) - [0.432 (6.38 + 0.88 GR)] ; Jones et al., 1992. Can. J. Anim. Sci. 72:237-244.
[2] Sum of the square cut shoulder, semi-boneless roast, loin and rack roast retail cuts weights trimmed to 6 mm of fat divided by the weight of those same primal cuts (shoulder, leg, loin).