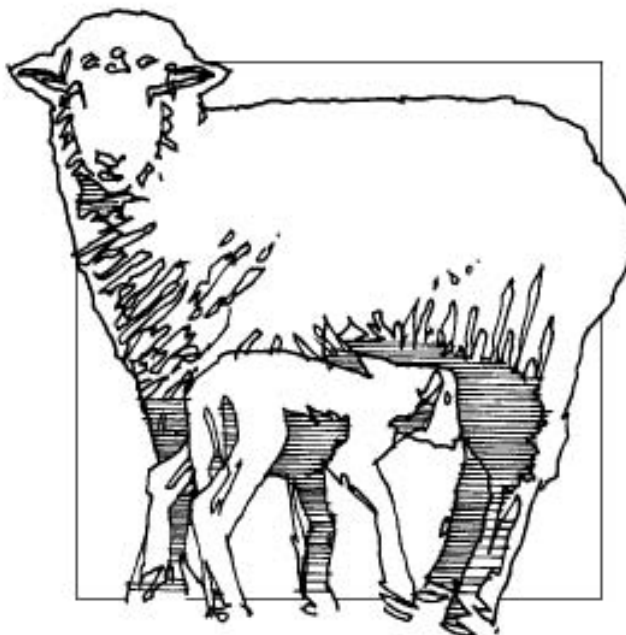# KANSAS SHEEP RESEARCH 1997

Report of Progress 785

Agricultural Experiment Station

Kansas State University, Manhattan

Marc A. Johnson, Director

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EFFECTS OF IMMUNOGLOBULIN TREATMENT ON SURVIVAL AND PREWEANING PERFORMANCE OF BABY LAMBS

F. J. Schwulst[1], D. G. Morrical2, D. G. Ely3, and D. K. Aaron3

Summary

Fall-born lambs of several breeds and breed combinations from university flocks in Iowa, Kansas, and Kentucky were or were not (controls) treated with subcutaneous injections of an immunoglobulin serum at birth. Treatment did not improve preweaning survival or any of the preweaning growth traits.

Introduction

Lamb losses between birth and weaning are probably the most serious detriments to profitability in the U.S. sheep industry. Preweaning death losses of 10-20% are not uncommon among American flocks. Previous studies have failed to demonstrate a prositive impact of commercial products on improving preweaning survival and/or growth of lambs. The objective of this project was to test the hypothesis that immunoglobulins do not enhance preweaning survival or growth performance of lambs.

Experimental Procedures

This project involved collaboration with sheep research units at Iowa State University and the University of Kentucky. In each state, the lambs were part of the fall lamb crop of 1994. A total of 769 lambs (Iowa 100, Kansas 504, Kentucky 165) were involved in the experiment. The genetic makeup of lambs at each station is presented in Table 1. Iowa lambs were all crossbreds, lambs at Kansas included both crossbreds and straightbreds, and all Kentucky lambs were straightbreds.

Newborn lambs were processed within 10 hours of birth, and every other lamb weighed and ear-tagged was either subjected to treatment with an immunoglobulin serum or served as a control. For treated lambs, dosage level was 10 cc of serum delivered subcutaneously with 5 cc at each side of the neck.

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The serum contained the needed protective antibodies to prevent or treat enteric and respiratory conditions in sheep. The antibodies were from five organisms commonly associated with diarrhea and respiratory problems.

Parameters measured were preweaning survival; 30-day weight; weaning weight; weight per day of age (30); weight per day of age (weaning); and average daily gains from birth to 30 days, from 30 days to weaning, and from birth to weaning.

Results and Discussion

The data strongly supported the hypothesis that treatment at birth with an immunoglobulin serum did not improve preweaning lamb survival or any of the lambs' growth traits through 60 days (data not shown).

Rearing type did affect lamb survival and growth traits. Single lambs were less likely to die before weaning and were heavier at 30 and 60 days than were lambs born as multiples. Single lambs also gained faster from birth to 30 days and from 30 days to 60 days. Data from lambs born as triplets or quadruplets were pooled with the twin data because of the low numbers.

Differences also occurred among sites. Iowa and Kentucky lambs were heavier at each weigh date and gained faster than Kansas lambs. Iowa and Kentucky lambs were also more likely to survive to weaning than Kansas lambs.

Table 1. Lamb Breed Combinations

Group	Rams	Ewes	No.
Iowa			
I1	Suffolk	½ Dorset ½ Polypay	53
I2	Suffolk	½ Romanov ½ Dorset	27
I3	½ Romanov ½ Dorset	½ Romanov ½ Dorset	20
Kansas			
K1	Rambouillet	Rambouillet	91
K2	Dorset	½ Rambouillet ½ Dorset ½ Rambouillet ½ Finn ½ Rambouillet ½ Booroola Merino	107
K3	Suffolk	¾ Rambouillet ¼ Finn ¾ Rambouillet ¼ Booroola Merino ½ Dorset ¼ Rambouillet ¼ Booroola Merino Rambouillet sired*	150
K4	Suffolk	Tunis sired* Romanov sired* Katahdin sired*	156
Kentucky			
KY1	Polypay	Polypay	128
	Polled Dorset	Polled Dorset	37

* = Ewes that were sired by Rambouillet, Tunis, Romanov, and Katahdin rams out of
    Rambouillet and Rambouillet-cross dams.

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THE INFLUENCE OF SIRE BREED ON LAMB CARCASS QUALITY AND SENSORY TRAITS OF LOIN CHOPS

J. L. Dunn[1], J. A. Unruh1, and F. J. Schwulst2

Summary

Thirty-two lambs sired by Katahdin, Rambouillet, Romanov, and Tunis rams were slaughtered to investigate sire-breed influences on carcass quality and sensory traits of loin chops. Carcasses from Tunis- and Romanov-sired lambs had (P<.05) more flank streaking and higher quality grades than carcasses from Katahdin- and Rambouillet-sired lambs. However, this difference did not translate into differences (P>.05) in either sensory panel or Warner-Bratzler shear evaluations. Therefore, we conclude that the breed of sires used in this study did not influence sensory traits of loin chops.

Experimental Procedures

Rambouillet and Rambouillet-crossbred ewes were bred to Katahdin, Rambouillet, Romanov, and Tunis rams to produce F_1 wether lambs. Thirty-two lambs sired by Katahdin (6), Rambouillet (9), Romanov (9), and Tunis (8) were processed in one of three slaughter groups at the Kansas State University Meat Laboratory. Carcass quality traits of maturity; flank streaking; conformation; flank color; external fat color and firmness; and ribeye color, marbling, texture, and firmness were collected at 48 h postmortem. Closely trimmed loins were fabricated and aged at 33°F for 7 d and frozen at -20°F until further analysis.

A 1-inch-thick loin chop was removed from the anterior end of each loin, weighed, and cooked to an internal temperature of 158°F. After 2 h of cooling at room temperature, chops were reweighed before three .5-in. cores were removed parallel to the muscle fiber. Cores were sheared through the center using a Warner-Bratzler shear (WBS) head on an Instron Model 4201 machine.

Two 1-in.-thick loin chops were removed posterior to the loin chop used for WBS. Both chops were cooked to an internal temperature of 158°F before .5 x .5 x 1 in. samples were evaluated by an eight-member, experienced, sensory panel. Chops were evaluated for myofibrillar tenderness, connective tissue amount, overall tenderness, juiciness, flavor intensity,

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and off-flavor using an eight-point scale. Samples were blocked by slaughter group (sensory session) and analyzed as a randomized block design. For sensory panel data, analysis was a split-plot with panel member as the subplot.

Results and Discussion

Carcass quality traits are presented in Table 1. Carcasses from Rambouillet-sired lambs had (P<.05) less maturity than carcasses from the other three sire groups. Carcasses from Tunis- and Romanov-sired lambs had (P<.05) more flank streaking and, therefore, higher (P<.05) quality grades than carcasses from Katahdin- and Rambouillet-sired lambs. Carcasses from Romanov- and Rambouillet-sired lambs had (P<.05) a whiter external fat color than those from Katahdin- and Tunis-sired lambs. Carcasses from Tunis-sired lambs had (P<.05) a finer textured ribeye than those from Romanov-sired lambs. All other quality traits measured were similar (P>.05) for carcasses from all four sire-breed groups.

Table 1. Influence of Sire Breed on Lamb Carcass Quality

| | Sire Breed | | | |
Trait	Katahdin	Rambouillet	Romanov	Tunis
No. of lambs	6	9	9	8
Maturity[a]	171[i]	1566[h]	171[i]	168[I]
Flank streaking[b]	431[h]	432[h]	628[i]	645[I]
Conformation[c]	11.8	11.2	11.9	11.7
Quality grade[c]	11.8[h]	11.5[h]	13.1[i]	12.9[i]
Flank color[d]	3.1	3.0	3.4	3.1
Fat color[e]	3.7	4.3[I]	4.4[i]	3.7[h]
Fat firmness[f]	2.7	3.6	3.8	3.6
Ribeye color[d]	4.3	4.2	5.0	4.5
Ribeye firmness[g]	6.3	6.4	7.0	6.5
Ribeye texture[h]	5.8[hi]	5.9[hi]	5.5[h]	6.3[I]
Ribeye marbling[b]	402	430	486	457

[a] Score: young lamb (A) = 100-199, older lamb (B) = 200-299.
[b] Scores of 100 to 1000: Small = 400-499; Modest = 500-599; Moderate = 600-699.
[c] Score: Ch- = 10; Ch° = 11; Ch+ = 12; Pr- = 13.
[d] Scores of 1 to 8: light pinkish-red = 3; pinkish-red = 4; slightly dark red = 5.
[e] Scores of 1 to 5: slightly yellow = 3; white = 4; very white = 5.
[f] Scores of 1 to 5: slightly soft = 2; firm = 3.
[g] Scores of 1 to 8: moderately firm = 6; firm = 7.
[h] Scores of 1 to 8: slightly fine = 5; moderately fine = 6; fine = 7.
[i] (P<.05)

Sensory panel and WBS traits are presented in Table 2. All sensory panel evaluations, WBS, and cooking losses were similar for all sire-breed groups. Therefore, we conclude that breed of sires used in this study did not influence sensory traits of loin chops.

Table 2. Influence of Sire Breed on Sensory Panel
and Warner-Bratzler Shear Traits of Loin Chops

Trait	Sire Breed			
	Katahdin	Rambouillet	Romanov	Tunis
Myofibrillar tenderness[a]	6.7	7.0	6.9	6.9
Connective tissue amount[b]	7.0	7.3	7.3	7.4
Overall tenderness[a]	6.8	7.1	7.0	7.0
Juiciness[c]	6.3	6.2	6.2	6.2
Flavor intensity[d]	5.8	6.1	5.9	5.8
Off flavor[e]	7.6	7.7	7.8	7.7
Warner-Bratzler shear, kg	3.9	3.4	4.0	3.1
Chop cooking loss, %	25.6	24.2	24.2	25.2

[a] Scores of 1 to 8: 6 = moderately tender; 7 = very tender; 8 = extremely tender.
[b] Scores of 1 to 8: 7 = practically none; 8 = none.
[c] Scores of 1 to 8: 6 = moderately juicy; 7 = very juicy.
[d] Scores of 1 to 8: 5 = slightly intense; 6 = moderately intense; 7 = very intensive.
[e] Scores of 1 to 8: 7 = practically none; 8 = none.

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THE INFLUENCE OF SIRE BREED ON LAMB CARCASS COMPOSITION AND SUBPRIMAL CUT YIELD

J. A. Unruh,[1] F. J. Schwulst,[2] and J. L. Dunn[1]

Summary

Thirty-two wether lambs sired by Katahdin, Rambouillet, Romanov, and Tunis rams were evaluated for carcass composition traits and subprimal cut yields. Carcasses from Romanov-sired lambs had (P<.05) less adjusted fat thickness and lower yield grades than carcasses from Tunis-sired lambs. Carcasses from Rambouillet-sired lambs had (P<.05) smaller ribeye areas than those from lambs in the other three sire groups. Subprimal weights and percentages were similar (P<.05) for carcasses from lambs in all sire groups. Although some differences in carcass traits were observed, breed of sire had minimal influence on subprimal yield and percentages.

Experimental Procedures

Rambouillet and Ramabouillet-crossbred ewes were bred to Katahdin, Rambouillet, Romanov, and Tunis rams to produce F_1 wether lambs. Thirty-two wether lambs sired by Katahdin (6), Rambouillet (9), Romanov (9), and Tunis (8) rams were processed in one of three slaughter groups at the Kansas State University Meat Laboratory. At 48 h postmortem, carcass data were collected, including live weight, hot carcass weight, dressing percentage, actual fat thickness, body wall thickness, adjusted fat thickness, yield grade, leg score, and ribeye area. Following carcass data collection, carcasses were fabricated into closely trimmed (<.1 in.) subprimal cuts following National Association of Meat Purveyors (NAMP) specifications. Weights and percentages of hot carcass weights for the 208 shoulder, 204A rib rack, 232A loin, and 233B leg were collected and calculated. The percentages of the four subprimal cuts were calculated by adding the four weights and dividing by the hot carcass weight: ((208 + 204A = 232A = 233B)/hot carcass weight) x 100. Data were blocked by slaughter group and anlayzed as a randomized block design.

Results and Discussion

Katahdin-sired lambs had heavier slaughter weights (P<.05) than Rambouillet-sired lambs (Table 1). Katahdin- and Tunis-sired lambs had heavier (P<.05) hot carcass weights than

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Rambouillet-sired lambs, and Tunis-sired lambs had a higher (P<.05) dressing percentage than both Katahdin- and Rambouillet-sired lambs. Even though actual fat thickness was similar (P>.05) for all sire groups, Romanov-sired lamb carcasses had (P<.05) less body wall thickness and adjusted fat thickness than Tunis-sired lamb carcasses. As a result, carcasses from Romanov-sired lambs had (P<.05) lower yield grades (higher cutability) than those from Tunis-sired lambs. Leg scores were similar (P>.05) for all sire groups, but Rambouillet-sired lamb carcasses had (P<.05) smaller ribeye areas than carcasses from the other three sire groups. Subprimal weights of carcasses from all four sire groups were similar (P>.05). However, carcasses from Romanov-sired lambs tended to have the highest numerical percentages of the four major subprimal cuts. Although differences in ribeye area and adjusted fat thickness and yield grade were detected, they did not translate into significant differences (<.05) in subprimal cut yields.

Table 1. Influence of Sire Breed on Lamb Carcass Composition and Subprimal Cut Yield

Trait	Sire Breed			
	Katahdin	Rambouillet	Romanov	Tunis
No. of lambs	6	9	9	8
Live wt., lb	111.9^c	105.0^b	107.8^{bc}	107.4^{bc}
HCW, lb	60.5^c	56.3^b	59.8^{bc}	61.0^c
Dressing percent, %	54.1^b	53.8^b	55.4$_{bc}$	56.9^c
Fat thickness, in.	.28	.28	.25	.32
Body wall thickness, in.	.99^{bc}	.96^{bc}	.84^b	1.09^c
Adjusted fat thickness, in.	.30^{bc}	.30^{bc}	.25^b	.35^c
Yield grade	3.4^{bc}	3.4^{bc}	2.9^b	3.9^c
Leg score^a	11.8	11.1	11.8	11.7
Ribeye area, in.^{2}	2.17^c	1.84^b	2.18^c	2.16^c
208 shoulder, lb	8.1	7.7	8.3	8.3
208 shoulder, %	13.4	13.7	13.8	13.5
204A rib rack, lb	4.0	3.6	3.9	3.9
204A rib rack, %	6.6	6.3	6.6	6.4
232A loin, lb	4.6	4.1	4.3	4.3
232A loin, %	7.5	7.2	7.2	7.1
233B leg, lb	11.1	10.8	11.7	11.7
233B leg, %	18.3	19.3	19.5	19.1
Four subprimal cuts, %	45.9	46.6	47.2	46.2

^{a} Score: Ch- = 10; Ch˚ = 11; Ch+ = 12.
^{bc} (P < .05).