

Truman State University Undergraduate Research

Performance Testing of Young Male Goats

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Executive Summary

Sixteen bucks from breeders in Missouri and Ohio participated in the 2003 Missouri Buck Test. Birth dates of entries ranged from November to March (2003) and start weights ranged from 23 to 103 pounds. To minimize stress on younger bucks, they were divided into two groups based on birth date and weight, with larger bucks in one group and smaller bucks in the second group. The test was performed in a confinement facility on the Truman State University campus. The test ran for 83 days, which is the minimum length recommended to obtain valid data.

Data collection began May 10, 2003. Upon arrival at the test site each participating buck was observed for health problems prior to facility admittance. Entrants were immediately introduced to the test concentrate feed and hay for a 6-day adjustment period. All bucks also received a booster vaccination for tetanus and *Clostridium perfringens* type C and D. Each buck was also treated with an anthelmintic (levamisole) for internal parasite control. Pens in which test animals were housed were bedded with straw, which was periodically stripped and replaced to provide a dry and clean environment. As a precaution against internal parasites, all bucks were dewormed a second time halfway through the test.

Because the custom concentrate contained fiber, hay was not needed during the test and was removed from the Bucks' diet after the adjustment period. The concentrate feed was modeled after that fed at the Langston University buck test. Bucks were fed free choice and provided with a continuous water supply. Bucks were weighed, using portable scales, every

seven days so that average daily gain could be calculated. Average daily gain ranged from 0.29 to 0.67 lb per day, with an average for all test animals of 0.49 lb per day (Table 1). A variety of body measurements were obtained on all bucks midway through the test and again on the final data collection day. These correlations between measured traits are valuable, because traits that are easily measured may be used to estimate traits that are less easily measured. Loin eye area and back fat measurements were obtained ultrasonically at termination of the test to aid in assessing carcass quality of potential sires. Average loin eye, area after adjustment for age, was 1.83 square inches. ADG and LEA enable breeders to choose herd sires that have the potential to pass to their offspring genes that support production of muscle mass appropriate to a meat goat.

The Concept of Buck Performance Testing

To improve selection of quality meat goat breeding animals on the basis of performance or genetic merit, it is necessary to conduct performance tests on selected candidate sires. Performance testing has been used in many species to identify desirable sires, but it must be done at a central testing station to remove the variation that different environments may cause. Having bucks under common conditions, as in our test, allows more accurate prediction of genetic potential since observed differences can be attributed mainly to genetic variation. By selecting sires that perform well in performance tests, breeders enhance the likelihood of obtaining increased growth and muscling, which in turn could improve profitability.

While there are other buck performance tests nationwide, none is currently available in Missouri. It is important to have a performance test available to Missouri producers so that breeders can evaluate potential sires in a climate similar to that in which they produce animals. The Missouri Meat Goat Producers Association therefore approached Dr. Tom Marshall.

Through joint efforts of Truman State University, Missouri Extension and Outreach, and the participating breeders, the 2003 Missouri Buck Test was successfully organized and executed.

Level of Participation

There were a total of six breeders who consigned a total of 16 bucks to the test. They included breeders from Missouri and one from Ohio.

Facility and Housing

Bucks were all housed in a confined area inside the Animal Health and Technology building on the Truman State University campus. Bucks were kept in two separate groups for the initial portion of the test, mainly to prevent larger bucks (placed in one group) from beating up the smaller and younger bucks (placed in the other group). The facility was well ventilated. Pens in which test animals were housed were bedded with straw that was periodically stripped and replaced to provide a dry and clean environment.

Feeds and Feeding Practices

All bucks were fed the same custom-designed concentrate ration (67% TDN) which was high in fiber, so no provision of hay or pasture was necessary. This method ensured that all individuals consumed identical diets and did not fill up on vegetation or hay. The feed, modeled after the feed fed at the Langston University Buck Test, was milled and pelleted by Silvermoon Feeds of Chillicothe, MO. Bucks were fed free choice from enclosed flow feeders and were provided fresh water ad libitum. Feeders were topped off as needed, as well as emptied and cleaned on a biweekly basis.

Healthcare Management

Upon delivery to the test site in April and May, each buck was visually examined for soundness. The day following delivery, test station staff vaccinated each buck with CD&T to

prevent enterotoxemia and tetanus. At this time bucks were also given levamisole boluses according to weight to control internal parasites.

During the performance test bucks were inspected daily for health problems. For the first two weeks of the test all individuals appeared healthy and were gaining weight as expected. Around May 15 test station staff noticed small sores around the nose and mouth of one of the bucks. Contagious ecthyma (soremouth) was suspected and the buck was isolated for several days until the pustules dried up. During this time test station staff took extra care in washing out water tanks and stripping old bedding to minimize the spread of soremouth. Only three other bucks exhibited soremouth symptoms and effects on their weight gain were not detectible. After the outbreak of soremouth, a few bucks exhibited signs of diarrhea, which was first suspected to be coccidiosis. Fecal samples, taken to a veterinarian, were determined to be normal but with a light parasite load. Bucks were immediately dewormed with Safeguard and the problem resolved shortly thereafter.

Data Collection

Test station staff collected data every Friday morning for the duration of the test. Each buck was weighed on a portable scale and the weight was recorded. Body measurements were obtained twice (May 30 and August 1, 2003), and at the termination of the test an ultrasound technician collected back fat and loin eye area measurements. Body measurements collected included body length, croup height, heart girth, forearm circumference, and scrotal circumference. A tailor's tape was used to measure the forearm, scrotum, and heart girth. The body length and croup height were measured with a custom-made measuring stick. Data was made available to producers via the web (<http://agriculture.truman.edu/goats>).

Results and Discussion

Growth and weight gain. Average daily gain (ADG) was determined for each buck by taking total weight gain divided by total number of days in the test [(final weight – start weight)/83]. ADG values varied widely: final ADG ranged from 0.29 to 0.67 lb per day with an average for all entrants of 0.49 lb per day (Table 1). On average, purebred Boer bucks had higher ADG than crossbred bucks. No significant effects of age on ADG were found, so no adjustment was made for age.

Loin Eye Area Measurements. Loin eye area (LEA) values ranged from 1.2 to 2.5 square inches (Table 2), with a mean of 1.83 square inches. Statistical analysis indicated that age has a significant effect on LEA, and so values were adjusted to an average age of 195 days for all the bucks to provide a more accurate comparison between individuals of different ages (Table 4).

Final Index and Placing. A final index (Table 4) for each buck was calculated using equally weighted values for ADG and LEA (Final Index = 0.5[ADG ratio] + 0.5[ADJ LEA ratio]). The average buck scored a 100 final index score. Remaining bucks fell on a continuous scale above and below the average. A buck scoring a 120 on the final index was 20 percent above his competition in the performance test. Final placing for buck performance was based on the final index score (Table 4).

Body measurements and Correlations. Body measurements were obtained and correlations between each measurable characteristic were determined (Table 3). Several pairs of measurements had very high correlation coefficients (R) while others were lowly correlated. For example: body weight had an R-value of at least 0.9 with body length, heart girth, forearm circumference, and LEA, and at least 0.8 with scrotal circumference. Interestingly, backfat was lowly correlated with all body measurements. These correlations may prove useful in estimating

harder-to-measure characteristics (e.g., LEA) from body measurements that are easily obtained.

Determining such relationships could help breeders estimate LEA.

Table 1: Buck weight data.

Tag	DOB	Breed	Birth type	10-May	16-May	23-May	30-May	6-Jun	13-Jun	20-Jun	27-Jun	4-Jul	11-Jul	18-Jul	25-Jul	1-Aug	ADG (Final)
				Sat	Fri	Fri	Fri	Fri	Fri	Fri	Fri	Fri	Fri	Fri	Fri	Fri	
lil	2/21/2003	50% Boer	triplet	23	24	25	28	30	32	34	37	42	43	48	50	54	0.37
line	2/21/2003	50% Boer	triplet	23	24	24	31	32	35	38	42	48	48	50	50	54	0.37
3	11/20/2002	100% Boer	triplet	92	96	100	110	111	119	120	127	133	123	132	130	133	0.49
4	11/25/2002	100% Boer	twin	93	99	106	109	115	121	120	122	130	124	132	130	132	0.47
8	2/6/2003	100% Boer	?	64	67	70	75	80	83	86	88	98	93	92	99	100	0.43
25	11/12/2002	100% Boer	twin	74	78	86	90	95	97	101	103	115	105	113	118	122	0.58
41	1/28/2003	100% Boer	single	61	60	65	72	76	81	82	89	94	94	98	105	108	0.57
47	1/30/2003	100% Boer	triplet	54	58	64	71	76	82	88	94	98	100	101	99	110	0.67
51	2/6/2003	100% Boer	?	55	52	54	60	60	66	66	69	76	72	75	80	82	0.33
55	2/6/2003	100% Boer	?	53	53	54	55	57	61	60	55	69	65	70	72	77	0.29
56	3/10/2003	50% Boer	?	53	54	58	63	63	68	73	80	86	86	87	94	98	0.54
57	2/22/2003	100% Boer	?	46	49	55	60	66	71	77	81	89	86	78	84	88	0.51
101	11/7/2002	100% Boer	twin	90	98	103	105	109	113	116	118	121	118	127	127	132	0.51
102	11/7/2002	100% Boer	twin	103	109	111	115	119	125	130	130	136	132	137	137	145	0.51
103	1/1/2003	100% Boer	twin	74	76	81	90	96	98	100	106	112	111	109	115	121	0.57
120	12/25/2002	100% Boer	twin	57	62	68	74	77	85	88	93	100	101	104	108	113	0.67
																	0.49

Table 2: Body dimension data for buck test entries.

ID	3	4	8	25	41	47	51	55	56	57	101	102	103	120	lil	line	mean
Body length	88.6	89.6	77.0	84.2	79.9	76.6	72.8	70.7	80.9	73.3	83.8	86.5	86.6	78.2	71.1	68.1	79.2
Croup height	64.1	56.5	52.2	86.4	56.2	56.0	51.2	49.2	51.9	51.9	61.0	61.0	54.8	52.8	47.5	45.6	56.1
Heart Girth	87.5	93.5	78.5	85.5	83.5	84.0	76.0	75.5	79.0	77.0	94.5	99.0	88.0	88.0	65.5	65.0	82.5
Forearm circumference	27.5	24.5	23.0	25.0	24.0	22.5	21.0	22.0	22.0	22.0	25.0	24.5	24.0	24.0	18.0	17.5	22.9
ADG	0.49	0.47	0.43	0.58	0.57	0.67	0.33	0.29	0.54	0.51	0.51	0.51	0.57	0.67	0.37	0.37	0.49
LEA	2.10	1.90	1.70	2.20	1.90	2.20	1.40	1.70	1.50	1.50	2.45	2.50	2.00	1.80	1.25	1.20	1.83
Scrotal circumference	31.0	30.0	27.5	28.0	27.0	27.0	20.0	22.0	29.5	25.5	28.0	27.5	28.0	26.5	19.5	20.0	26.1

Table 3: Correlation coefficients between collected body measurements.

	<i>Body weight</i>	<i>Body length</i>	<i>Croup height</i>	<i>Heart Girth</i>	<i>Forearm circumference</i>	<i>Backfat</i>	<i>LEA</i>	<i>Scrotal circumference</i>
Body weight	1							
Body length	0.92	1						
Croup height	0.62	0.60	1					
Heart Girth	0.97	0.87	0.52	1				
Forearm circumference	0.92	0.85	0.65	0.86	1			
Backfat	0.60	0.45	0.64	0.51	0.60	1		
LEA	0.90	0.74	0.66	0.89	0.81	0.79	1	
Scrotal circumference	0.86	0.87	0.52	0.77	0.85	0.51	0.67	1

Table 4: Final index values for placing bucks.

Producer	ID	AGE (Days)	ADG (lbs/day)	LEA (in²)	ADJ LEA (in²)	ADJ LEA Ratio	ADG Ratio	Final Index
Wiley	47	175	0.67	2.2	2.35	128.61	136.73	132.67
Schriener	120	211	0.67	1.8	1.68	91.76	136.73	114.25
Wiley	41	177	0.57	1.9	2.04	111.37	116.33	113.85
Schriener	103	204	0.57	2	1.93	105.60	116.33	110.97
Luchini	56	136	0.54	1.5	1.95	106.56	110.20	108.38
Brimlee	102	259	0.51	2.5	2.01	110.05	104.08	107.07
Schriener	25	254	0.58	2.2	1.75	95.73	118.37	107.05
Brimlee	101	259	0.51	2.45	1.96	107.32	104.08	105.70
Luchini	57	152	0.51	1.5	1.83	99.91	104.08	101.99
Average		195.25	0.49	1.83	1.83	100	100	100
Sherwood	3	246	0.49	2.1	1.71	93.59	100.00	96.80
Luchini	8	168	0.43	1.7	1.91	104.18	87.76	95.97
Sherwood	4	241	0.47	1.9	1.55	84.74	95.92	90.33
Luchini	55	168	0.29	1.7	1.91	104.18	59.18	81.68
Leunen	lil	153	0.37	1.25	1.57	85.82	75.51	80.67
Leunen	line	153	0.37	1.2	1.52	83.09	75.51	79.30
Luchini	51	168	0.33	1.4	1.61	87.78	67.35	77.56