Returns on Ram Selection: a theoretical 10-year budget scenario to estimate financial return on selection for measureable economically important traits.

By Tom Stanley, Extension Agent, Farm Business Management

The attached budgets and tables attempt to illustrate the financial impact a focused sire-selection program can have on flock performance and financial returns. The author has attempted to describe a spring lambing sheep flock that is experiencing significant parasite pressure and has a genetic base with moderate to low growth rates. The analysis attempts to quantify the financial impacts that consistent application of selection standards over time. The analysis illustrates annual net income being improved by 14% when selecting for growth alone, 23% when selecting for lower fecal egg count alone, and 38% when sires are used that improve both growth and lower fecal egg count. Table 5 calculates the value each ram brings to the particular selection program.

The flock's financial performance in the first year of the selection program is illustrated in the complete enterprise budget that follows. The author has set flock size at 100 ewes since this makes the costs and returns a little easier to inspect at a glance since when looking at total costs for the flock- cost per ewe can be determined simply by moving the decimal two places. The budget assumes a ratio of 25 ewes to one ram. In the case of flocks smaller than 25 ewes or there are fewer ewes per ram the estimated returns to the shepherd for each ram selected will be lower.

These budget projections attempt to quantify the financial benefit that can be captured when heritable traits of economic importance can be quantitatively measured and sire selection based on these traits is consistently applied over time. Recent interest in sires rated for their fecal egg count and the success in improving parasite resistance through sire selection in Australia and New Zealand prompts us to explore the possible financial benefit from purchasing rams identified as having lower fecal egg counts.

There are limitations to this type of analysis. The heritability of the selected trait(s) and the number of traits that are simultaneously selected for impacts the rate of progress. The plethora of other management and environmental factors that impact costs and returns alter what a shepherd will actually experience. However, it is the type of analysis presented here that allows us to hold these other factors constant and hopefully isolate and observe the benefits that can be realized through sire selection. In this scenario, the flock in year one is composed of ewes with typical fecal egg counts and moderate to low growth rates, therefore there is 'room to improve'. Flocks that have already achieved high rates of growth or have high levels of parasite resistance are less likely to realize as much gain as is illustrated here.

Points to Remember:

1) This is a 'theoretical exercise' intended to illustrate the progress a shepherd can make with a flock that has potential to improve in both growth and parasite resistance.

2) The progress in flock performance described in these budget scenarios is accomplished exclusively through ram selection. It is assumed that the rams that have superior performance for growth and/or lower FEC are accurately identified. Much more rapid progress could be achieved if a shepherd also purchases replacement ewes that are superior in the performance areas described (growth and/or lower fecal egg count).

3) Genetic progress on a flock basis is a process of years and requires focus and planning. The more traits we attempt to improve, the slower the progress.

4) Aggressive selection for one trait often results in compromising on other traits.

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COMPLETE ENTERPRISE BUDGET, YEAR 1 OF SIRE SELECTION SCENARIO

100 EWES $8,837.48 =Net Income

170% LAMB CROP | **4 RAMS** | **100% OF LAMBS FINISHED WITH PURCHASED FEED**

20% LAMB Death Loss | **20% CULLS** | **40 WEANING WEIGHT (LBS)**

1.36 = Lambs Raised per Ewe | **0.50 ADG** | **7.0 TO 1 POST WEANING FEED CONVERSION**

ITEM	HEAD		CWT	UNIT	PRICE		QUANTITY	TOTAL	Your Farm
1. GROSS RECEIPTS		20% Percent of Lambs Unthrify				$/hd			
Good Lambs	94	@	1.10	Cwt	$200.00	220.00	102.96	$20,592.00	
Unthrifty Lambs	23	@	0.65	Cwt	$230.00	149.50	15.21	$3,498.30	
Cull Ewes	16	@	1.50	Cwt	$90.00		24.00	$2,160.00	
Cull Ram	1	@	2.00	Cwt	$80.00		2.00	$160.00	
Wool			6.50	Lbs/Head	$0.80		669.50	$535.60	
2. TOTAL GROSS RECEIPTS						**$269.46**	**Per Ewe**	**$26,945.90**	
3. VARIABLE COSTS									
			Est. Acres=	52.55					
	Feed Loss	T/Ac							
Alfalfa Hay	5.0%			Ton	$135.00		5.50	$742.49	
1st cutting grass hay	20.0%			Ton	$50.00		0.00	$0.00	
2nd cutting grass hay	5.0%	1.50	10.22	Ton	$180.00		15.33	$2,759.40	
Stkpld Fescue DM	15.0%	3.00	8.91	Ton	$20.00		26.72	$534.46	
Pelleted Supplement	2.0%			Ton	$275.00		13.73	$3,774.69	
Corn	2.0%			Ton	$175.00		12.03	$2,104.69	
		Lbs per							
Flush Ewes	0.5	Ewe	21	days	$400.00	per Ton	0.53	$210.00	
Perinneal Alf/Grass DM	15.0%	4.00	11.19	Ton	$20.00		44.75	$895.02	
Summer Annual DM	15.0%	3.50	1.23	Ton	$20.00		4.31	$86.25	
Winter Annual DM	15.0%	2.00	0.00	Ton	$20.00		0.00	$0.00	
Grinding & Mixing		Cwt		Cwt	$0.00		0.00	$0.00	
Salt & Mineral		Lbs per Ewe		Cwt	$20.00		19.58	$391.64	
Vet & Medicine		$/Head		Head	$7.57		100	$756.78	
Shearing & Wool Handling				Head	$6.00		104	$624.00	
Supplies				Head	$5.00		100	$500.00	
Electric Netting				Rolls	$125.00		4	$500.00	
Replacement Ram				Head	$600.00		1	$600.00	
Synchronize ewes				Head	$0.00		100	$0.00	
Stockpiled Pasture	0.00	Acres per Ewe		Acre	$51.00		0	$0.00	
Pasture	0.35	Acres per Ewe		Acre	$12.00		35	$420.00	
Haul Cull Sheep				Head	$2.00		17	$34.00	
Market Cull Sheep	12	$/Head		Head	$7.09		17	$204.00	
Haul Sheep				Head	$3.00		93.6	$280.80	
Market Sheep	12	$/Head		Head	$9.60		93.6	$1,123.20	
Virginia Check-off				Head	$0.50		134	$67.00	
Building & Fence Repairs				Head	$12.00		100	$1,200.00	
Utilities				Head	$0.90		100	$90.00	
Bedding	8	Lbs per Ewe		Ton	$80.00		0.4	$32.00	
Machinery (Non-Crop)				Head	$1.78		100	$178.00	
Land Rental				Acre/Year	$0.00		35	$0.00	
Labor		Hours per Week		Hours	$0.00		0	$0.00	
Operating Interest	12	Months		Dollars	0.00%		$ 16,466	**$0.00**	
4. TOTAL VARIABLE COSTS						**$181.08**	**Per Ewe**	**$18,108.42**	
5. ANNUAL DEBT PAYMENTS								**$0.00**	
6. PROJECTED NET RETURN TO EQUITY, MANAGEMENT, & FAMILY LABOR						**$88.37**	**Per Ewe**	**$8,837.48**	

Table 1.			**Projected Returns When Level of Performance Remains Constant**								
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
% Lamb Crop	170	170	170	170	170	170	170	170	170	170	
% of Lamb Death Loss	20	20	20	20	20	20	20	20	20	20	
% of Lamb Crop Unthrifty but marketed	20	20	20	20	20	20	20	20	20	20	
% Culling Rate	20	20	20	20	20	20	20	20	20	20	
Weaning Weight	40	40	40	40	40	40	40	40	40	40	
Days on Feed	140	140	140	140	140	140	140	140	140	140	
Avg Daily Gain	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	
Annual Drenches*	797	797	797	797	797	797	797	797	797	797	
Annual Drench Cost	$ 119.35	$ 119.35	$ 119.35	$ 119.35	$ 119.35	$ 119.35	$ 119.35	$ 119.35	$ 119.35	$ 119.35	
Total Cost / Ewe	$ 197.14	$ 197.14	$ 197.14	$ 197.14	$ 197.14	$ 197.14	$ 197.14	$ 197.14	$ 197.14	$ 197.14	
Return / Ewe	$ 73.37	$ 73.37	$ 73.37	$ 73.37	$ 73.37	$ 73.37	$ 73.37	$ 73.37	$ 73.37	$ 73.37	
Net Present Value of Income Stream per Ewe over 10 years:				**$625.86**							
*Annual Drenches = Total number of times a de-worming drench is administered to either a sheep or a lamb											
Scenario Assumptions:						**Essential Performance Benchmarks:**					
Spring Lambing Flock with high parasite load.						Lambing Percentage					
100 ewes, 4 rams, one ram purchased annually						Ewe Cull Rate					
Management Uses FAMACHA for deworming decisions						Lamb Death Loss					
Healthy Lambs weigh 110 lbs at market, and bring $2.00 / lb						% Unthrifty Lambs (survive to be marketed but are poor quality)					
Unthrifty Lambs weigh 65 lbs at market and bring $2.30 / lb						Weaning Weight					
No labor, land rent, or interest charges in this budget						Total Number of Times Drench Administered					
Interest Rate for Net Present Value Calculations:				3.00%		Avg Daily Gain by Lambs on Feed					

Table 2. Projected Returns When Ram Selection Focuses On Growth

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	% Change Yr10 vs Yr 1
% Lamb Crop	170	170	170	170	170	170	170	170	170	170	0%
% Death Loss	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0%
% Unthrifty Lambs	20	20	20	18	18	18	18	18	18	18	-10%
% Culling Rate	20	20	20	20	20	20	20	20	20	20	0%
Weaning Weight	40	40	45	45	47	47	50	52	55	55	38%
Days on Feed	140	133	118	118	110	105	92	89	81	79	-44%
Avg Daily Gain	0.500	0.525	0.550	0.550	0.575	0.600	0.650	0.650	0.675	0.700	40%
Annual Drenches*	797	797	797	797	797	797	797	797	797	797	0%
Annual Drench Cost	$ 119.35	$ 119.35	$ 119.35	$ 119.35	$ 119.28	$ 119.28	$ 119.28	$ 119.28	$ 119.28	$ 119.28	0%
Total Cost / Ewe	$ 181.08	$ 178.97	$ 174.90	$ 173.28	$ 184.39	$ 182.03	$ 176.96	$ 175.15	$ 172.45	$ 170.38	-6%
Return / Ewe	$ 88.37	$ 90.49	$ 94.56	$ 97.82	$ 86.71	$ 89.08	$ 94.15	$ 95.95	$ 98.66	$ 100.72	14%

Net Present Value of Income Stream per Ewe over the first ten years of intense selection: $796.82

*Annual Drenches = Total number of times a de-worming drench is administered to either a sheep or a lamb

Table 3. Projected Returns When Ram Selection Focuses On Lower Fecal Egg Count.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	% Change Yr10 vs Yr 1
% Lamb Crop	170	170	170	170	170	170	170	170	170	170	0%
% Death Loss	20	20	18	18	16	14	13	12	10	10	-50%
% Unthrifty Lambs	20	20	18	18	16	15	13	11	9	7	-65%
% Culling Rate	20	20	20	20	18	16	13	15	15	15	-25%
Weaning Weight	40	40	39	39	38	37	37	37	37	36	-10%
Days on Feed	140	140	149	158	169	172	183	183	183	185	32%
Avg Daily Gain	0.500	0.500	0.475	0.450	0.425	0.425	0.400	0.400	0.400	0.400	-20%
Annual Drenches*	797	797	618	598	412	396	378	220	219	198	-75%
Annual Drench Cost	$ 119.35	$ 119.35	$ 93.37	$ 86.70	$ 67.40	$ 61.52	$ 55.05	$ 34.55	$ 34.83	$ 30.78	-74%
Total Cost / Ewe	$ 181.08	$ 181.08	$ 183.71	$ 183.67	$ 202.99	$ 206.68	$ 208.00	$ 209.32	$ 212.25	$ 213.57	18%
Return / Ewe	$ 88.37	$ 88.37	$ 93.62	$ 93.66	$ 85.12	$ 92.17	$ 98.43	$ 100.37	$ 107.89	$ 108.53	23%

Net Present Value of Income Stream per Ewe over the first ten years of intense selection:	**$811.31**							
*Annual Drenches = Total number of times a de-worming drench is administered to either a sheep or a lamb								

Table 4.		**Projected Returns When Ram Selection Focuses On Both Growth And Lower Fecal Egg Count.**									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	% Change Yr10 vs Yr 1
% Lamb Crop	170	170	170	170	170	170	170	170	170	170	0%
% Death Loss	20	20	19	18	17	17	16	15	12	11	-45%
% Unthrifty Lambs	20	19	18	17	17	17	16	15	12	11	-45%
% Culling Rate	20	20	20	20	18	17	16	15	15	15	-25%
Weaning Weight	40	40	42	42	43	45	45	47	48	49	23%
Days on Feed	140	140	136	130	122	118	118	110	103	102	-27%
Avg Daily Gain	0.500	0.500	0.500	0.525	0.550	0.550	0.550	0.575	0.600	0.600	20%
Annual Drenches	797	797	802	806	566	565	567	569	567	570	-28%
Annual Drench Cost	$ 119.35	$ 119.35	$ 119.91	$ 120.47	$ 88.96	$ 87.88	$ 87.22	$ 86.56	$ 87.04	$ 87.46	-27%
Total Cost / Ewe	$ 181.08	$ 181.26	$ 180.61	$ 181.79	$ 196.46	$ 191.73	$ 192.87	$ 191.99	$ 194.59	$ 192.20	6%
Return / Ewe	$ 88.37	$ 89.02	$ 92.57	$ 96.38	$ 88.68	$ 94.15	$ 96.71	$ 103.41	$ 114.14	$ 121.73	38%
Net Present Value of Income Stream per Ewe over the first ten years of intense selection:				**$833.74**							
*Annual Drenches = Total number of times a de-worming drench is administered to either a sheep or a lamb											

Table 5.			
System/Description	Net Present Value of Income Stream per ewe over 10-year period of sire selection	Net Present Value of income stream per ewe, multiplied by 25 ewes and spread across 2.5 rams*	Dollars delivered to the shepherd by each ram above what will be realized from a 'grade ram' that does not improve the flock in either growth or fecal egg count.**
Flock Maintains Level Performance	$625.86	$6,258.60	$0.00
Rams are selected for Growth only	$796.82	$7,968.20	$1,709.60
Rams are selected for Low FEC only	$811.31	$8,113.10	$1,854.50
Rams are selected for both Low FEC and Growth	$833.74	$8,337.40	$2,078.80
		*2.5 rams = 10 year period with a new ram introduced every 4 years	**based on 25 ewes per ram, new ram every 4 years