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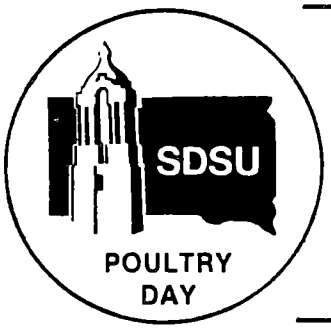

SUNFLOWER, SOYBEAN AND MEAT MEALS IN LAYING DIETS

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A previous study (POULTRY 81-6) had shown that hens on diets utilizing sunflower meal as the major protein source supported fair egg production, whereas meat and bone meal as the major protein source supported substandard performance. Hen-day egg production was 15% poorer and feed intake was off by 22 grams per day averaged for all groups on the meat and bone meal diets.

A study was conducted to investigate this type of response further and to compare the performance obtained with these protein sources to that obtained with the source being soybean meal as well as combinations of soybean meal and meat and bone meals and sunflower and meat and bone meals. All supplements were used to produce 12 and 16% protein diets. In all cases, the diets were supplemented with methionine and/or lysine to provide the NRC (1977) requirements, based on analyses of the protein and amino acid contents.

Pullet chicks of the Shaver-288 strain were grown in cages on a 19% protein corn-soy starter diet and from 10 to 20 weeks of age on a 12% protein oats-soy diet. They were transferred to laying cages and at 24 weeks of age each of the experimental diets shown in Table 1 were fed to six groups of 12 pullets. It should be noted that with the combination of protein sources for the 16% protein diet 80% of the supplemental protein was supplied by the meat and bone meal and only 20% from the soybean or sunflower meal. For the 12% protein diets, 54% of the supplemental protein was supplied by the meat and bone meal.

The data shown in Table 2 confirm the previous results showing the poor performance of hens on the all meat and bone meal diets--being most evident with the 12% protein diets. Examination of the amino acid composition information would suggest that these diets could be limiting in tryptophan. However, the combination diets of 12% protein contained similar tryptophan levels and yet the hens on those diets performed very well, particularly those on the sunflower-meat meal combination. One might suspect that the high level of phosphorus in the 16% protein all meat and bone meal diet reduced performance. However, the combination 16% protein diets contained almost as much phosphorus and yet hens on those diets performed very well. The standard concern is evident here--was performance reduced because the hens ate less feed or did they perform poorer because they ate less?

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Further work is necessary to provide the answers to these and other questions. However, this work shows that sunflower meal can be used to replace all of the soybean meal in layer diets if lysine and methionine are considered. Sunflower meal was shown to be superior to soybean meal when meat and bone meal supplied about half of the supplemental protein, i.e., in the 12% protein diets. However, we could not at this point recommend using all meat and bone meal as a supplemental protein source. This is not a new recommendation.

Table 1. Composition of Diets Used in Layer Study, %

	Soybean meal		Sunflower meal		Meat and bone meal		Soybean-meat/bone		Sunflower-meat/bone	
Corn	66	76	54.5	70.5	75	81.0	73	79	69	74.5
Soybean meal	20.5	10.5	--	--	--	--	4.0	4.5	--	--
Sunflower meal	--	--	32.0	16.0	--	--	--	--	8.0	9.0
Meat and bone meal	--	--	--	--	18.0	9.0	15.0	5.0	15.0	5.0
Dehydrated alfalfa	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Dicalcium phosphate	2.5	2.5	2.0	2.5	--	--	--	1.5	--	1.5
Limestone	8.0	8.0	7.0	8.0	4.0	7.0	5.0	7.0	5.0	7.0
Yellow grease	--	--	1.5	--	--	--	--	--	--	--
Vitamin premix	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
Salt	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
Methionine	--	.13	--	.06	--	.08	--	.07	--	.06
Lysine	--	.10	.03	.22	--	.2	--	.2	--	.2
Calculated analysis, %										
Protein	16.1	12.1	16.1	12.1	16.0	12.1	16.3	12.0	16.3	12.1
M.E./kg	2774	2858	2713	2777	2916	2940	2890	2907	2797	2800
Methionine + cystine	.56	.50	.54	.50	.51	.50	.52	.50	.53	.50
Lysine	.8	.63	.60	.60	.60	.60	.70	.60	.60	.60
Tryptophan	.2	.15	.22	.16	.13	.11	.15	.13	.16	.12
Isoleucine	.8	.6	.9	.6	.6	.5	.7	.6	.6	.6
Valine	.8	.6	1.0	.7	.8	.6	.8	.6	.8	.6
Threonine	.7	.5	.7	.5	.6	.5	.6	.5	.7	.5
Calcium	3.33	3.31	3.27	3.33	3.27	3.31	3.29	3.25	3.30	3.28
Phosphorus	.57	.56	.53	.58	1.00	.55	.85	.60	.86	.63

Table 2. Performance of Hens on Various Protein Sources and Levels

Protein level/type	Egg production, %	Daily feed consumed, g	Feed per day, kg	Egg wt., g	Body wt., kg	Mortality %	Haugh units
16% protein							
Soybean	87.8	125	1.71	64.9	1.74	9.7	83
Sunflower	82.5	130	1.90	64.3	1.73	12.5	85
Meat and bone	68.4	108	1.90	61.4	1.69	8.3	85
Soy-meat	84.6	122	1.74	62.9	1.79	6.9	84
Sun-meat	86.6	122	1.70	63.1	1.77	11.1	83
Avg	82.0	121	1.79	63.3	1.74	9.7	84
12% protein							
Soybean	81.0	120	1.79	63.9	1.76	4.2	83
Sunflower	82.3	128	1.87	62.3	1.74	5.6	85
Meat and bone	46.4	92	2.46	59.7	1.63	6.9	86
Soy-meat	72.5	107	1.77	61.8	1.64	6.9	86
Sun-meat	81.7	119	1.79	62.3	1.70	2.8	85
Avg	72.8	113	1.94	62.0	1.69	5.3	85
Average of both levels of protein							
Soybean	84.3^{a}	122^{b}	1.70^{a}	64.3^{a}	1.74^{a}	6.9^{a}	83^{a}
Sunflower	82.4^{a}	129^{a}	1.84^{a}	63.2^{a}	1.73^{a}	9.1^{b}	85^{a}
Meat and bone	57.4^{c}	100^{d}	2.12^{b}	60.5^{b}	1.66^{a}	7.6^{b}	86^{a}
Soy-meat	78.5^{b}	114^{c}	1.69^{a}	62.2^{a}	1.71^{a}	6.9^{a}	85^{a}
Sun-meat	83.3^{a}	121^{b}	1.69^{a}	62.7^{a}	1.73^{a}	6.9^{a}	84^{a}

There was a significant difference between performance of hens on 16 vs 12% protein for egg production ($P<0.05$), daily feed consumption and mortality but with no significant difference for other parameters.

Means with the same subscript in the same column are nonsignificant ($P<0.05$).