1985

Seventeenth Annual Poultry Field Day

Animal Science Department
South Dakota State University

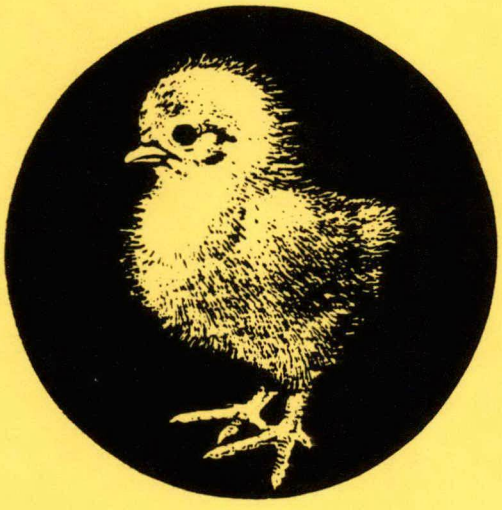
17th ANNUAL

SDSU

POULTRY DAY

INCLUDING SD POULTRY INDUSTRY ASSOCIATION
ANNUAL REPORT

THURSDAY, NOV. 7, 1985
SIOUX FALLS, SD



DEDICATION

Dr. C. WENDELL CARLSON,
PROFESSOR, ANIMAL & RANGE SCIENCES

Dr. C. Wendell Carlson retired June 30, 1985, after 36 years of dedicated service to the poultry industry, agriculture, and higher education. This scientist, educator, adviser and animal agriculture spokesman taught 1413 undergraduate students in Poultry Science and had 407 students in Animal Nutrition over the years. He also guided 19 M.S. and 15 Doctoral students toward their advanced degrees.

Carlson has published 110 journal articles, co-authored one book and wrote chapters in two others, and has written 138 field day reports, popular articles, technical bulletins and fact sheets. He also led 27 poultry research projects and served as director of the feed mill for 12 years.

He has distinguished himself internationally by presenting research papers at World Poultry Congresses in Brazil, Finland, Spain and the United States, and by serving with the International Executive Service Corps in assisting feed manufacturers in Santa Catarina, Brazil and the Dominican Republic.

Over the years, he was named a fellow of the American Association for the Advancement of Science (1956) and the Poultry Science Association (1973); won the National Turkey Federation research award of the Poultry Science Association (1961) and research awards from the F. O. Butler Foundation (1984), and Gamma Sigma Delta (1985); received the Poultryman of the Year Award from the South Dakota Poultry Industries Association (1971), and held offices including, director, second vice president, first vice president and president of the Poultry Science Association (1966-71), associate editor and section editor of the journal, "Poultry Science" (1972-84), and secretary-treasurer of the South Dakota Poultry Industries Association (1977-85).

SEVENTEENTH ANNUAL POULTRY DAY

Thursday, November 7, 1985
Ramada Inn, Sioux Falls, South Dakota

9:30 a.m. REGISTRATION AND REFRESHMENTS
($10 - includes lunch and proceedings)

RESEARCH REVIEW SESSION
Dr. John R. Romans, Presiding

10:00 a.m. Dried Colostrum for Growing Turkeys
- Dr. Ali B. Kashani

10:30 a.m. Pelleting Turkey Diets
- Dr. C. Wendell Carlson

11:00 a.m. Alternative Sources of Protein for Layers
- Dr. Ali B. Kashani

11:30 a.m. Temperature Effects on the Requirements for Layers
- Dr. Craig Coon, University of Minnesota

12:00 NOON - LUNCH
Phillip E. Plumart, Master of Ceremonies
Recognition of Dr. C. W. Carlson for
36 Years of Dedicated Service

EDUCATIONAL SESSION
Dale Borchard, Dakota Best, Inc., Presiding, President SDPIA

2:00 p.m. Recent Developments in Animal Welfare
- Dr. Hugh Johnson, American Farm Bureau Federation

2:30 p.m. Your National Turkey Federation
- John Holden, President, National Turkey Federation

3:00 p.m. American Egg Board - Doing Those Things No One Else Can!
- Steve Grenade, Communications Manager, American Egg Board

3:30 p.m. Egg and Turkey Promotion in South Dakota
- Kris Brockhoft, SDPIA Egg and Turkey Promoter

4:00 p.m. Annual Business Meeting of SDPIA
- Dale Borchard, President SDPIA, presiding

5:00 p.m. Board of Directors Meeting, SDPIA

Who's Who

Dale W. Borchard, (President, SDPIA), Owner, Dakota Best, Inc., Redfield, South Dakota

Darwin G. Britzman, Ph.D., Director of Research, Harvest States Coop, GTA Feed Division, Sioux Falls, South Dakota

Kris Brockhoft, Egg and Turkey Promoter, SDPIA, Sioux Falls, South Dakota

C. Wendell Carlson, Ph.D., Professor and Leader, Poultry Research and Extension, Department of Animal and Range Sciences, South Dakota State University, Brookings, South Dakota

Craig Coon, Ph.D., Associate Professor, Department of Animal Science, University of Minnesota, St. Paul, Minnesota

Steve Grenade, Communication Manager, American Egg Board, Park Ridge, Illinois

Hugh Johnson, Ph.D., Director of Poultry Department, American Farm Bureau Federation, Park Ridge, Illinois

John Holden, President, National Turkey Federation, Turkey Grower, Northfield, Minnesota

Ali B. Kashani, Superintendent, Poultry Research Center, Department of Animal and Range Sciences, South Dakota State University, Brookings, South Dakota

Phillip E. Plumart, Extension Poultry Specialist, Department of Animal and Range Sciences, South Dakota State University, Brookings, South Dakota

John R. Romans, Ph.D., Head, Department of Animal and Range Sciences, South Dakota State University, Brookings, South Dakota

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PELLETING TURKEY DIETS

M. Hassibi [1], A. B. Kashani [1] and C. W. Carlson [1]

Department of Animal and Range Sciences

POULTRY 85-1

The pelleting process for feed production consists of compressing feed into pellets suitable for the particular animal involved. Feed is forced through small holes in a round die, utilizing steam. Some feedstuffs are more conducive to producing good pellets than others, e.q. wheat, probably because of its gluten, usually improves pellet quality, whereas, oats is difficult to pellet. The addition of fat may allow for increased quality and yield up to a point, but beyond 4-5% fat causes the pellets to be quite unstable and they break apart easily in handling.

The growth and feed utilization of turkeys can frequently be enhanced by pelleting. The responses are usually quite limited on high energy corn-soy type diets but with high fiber diets, marked improvements can be obtained. With this concern, a series of studies have been conducted with growing turkeys to evaluate the pelleting process (Poultry 83-4, 84-11).

The previous studies have involved use of wheat bran or sunflower meal, both of which are high in fiber, to enhance the pelleting response. Pelleting a corn-soy series of diets of the type used by Guenthner et al. (1978) did not improve growth, whereas, feed conversion was only slightly enhanced. But by adding 20% wheat bran, the growth responses were enhanced 7% even with poor pellets and 11% with firm pellets. Feed conversions were improved by 3 and 6%, respectively. When a corn-sunflower diet was used, growth and feed conversions were enhanced 3% by pelleting.

Much earlier (Carlson, et al. 1962) we had shown turkeys on pelleted diets containing oats to perform as well as these on corn. Therefore, it was logical to ascertain what the pelleting of an oats-containing diet would do and also to consider the addition of a similar amount of fiber from corn cobs. The results are shown in Table 1.

Surprisingly, oats alone appeared to enhance performance - this further demonstrates the ability of the turkey to tolerate fiber. Only the firm pellet appeared to improve growth performance (1%, not significant), however, feed conversion was

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[1] Graduate Assistant; Superintendent, Poultry Research Center and Professor Emeritus, respectively.

enhanced by 6%. Another surprise was that the corn cob dilution effect did not reduce growth performance. Again pelleting enhanced feed conversion by 8%.

In conclusion, pelleting of turkey feeds would therefore not be recommended for corn-soy diets. Where high fiber ingredients are included, such as wheat by-products or sunflower meals, pelleting may allow for performance equal to or superior to that obtained with high energy corn diets. This could permit the use of many lower quality ingredients in turkey feed.

Table 1. Pelleting High Fiber Diets

Treatment	8 wk	20 wk	Feed/Gain
	Wt. - Kg		
Corn-Soy	3.33	12.52	3.2
Oats, 30%	3.43	12.87	3.4
Firm Pellet, 30%	3.59	13.01	3.2
Poor Pellet, 30%	3.46	12.86	3.2
Corn Cobs, 18%	3.20	12.54	3.6
Firm Pellet, 18%	3.49	13.12	3.3

MEAT AND BONE MEAL WITH VARIOUS GRAINS FOR EGG PRODUCTION

Ali B. Kashani [1] and C. Wendell Carlson [1]

Department of Animal and Range Sciences

POULTRY 85-2

As the sole protein supplement in corn-type diets for laying hens, meat and bone meal has not allowed for satisfactory performance in studies conducted at South Dakota State University (Poultry 81-6, 82-8, 83-2,84-1). With meat and bone meal as the only protein supplement, feed intake is reduced and poor egg production and feed utilization results. The effects were most marked with 12% protein diets, even with lysine and methionine made adequate by NRC standards.

When either sunflower or soybean meal replaced portions of the meat and bone meal as the protein supplements, performance was markedly enhanced. With 50% or less of the protein supplement coming from meat and bone meal, performances were satisfactory. In a previous study (Poultry 84-8), oats or wheat or their combination were used to replace all or part of the yellow corn in the layer diet. With either grain replacing all of the corn or the combination of oats and corn performances were improved, but with equal amounts of all grains, performance was equal to that of hens on control corn-soy diet.

This study was repeated using 7 replicate groups of 12 pullets per treatment and some of the results are shown in Table 1. In this case the response from oats was not significant, but the use of wheat or either of the combinations allowed for performance equal to or better than the control diet. Feed intake was low for the all corn diet during the first two 4-week periods which suggests again that the reduced palatability induced by the meat and bone meal was a factor responsible for the poor performance. Preliminary assays have suggested isoleucine and tryptophan levels to be suboptimal but more recent assays showed that not to be the responsible factor(s). Further studies will be necessary to elucidate the problem. The reduction in mortality evident among the oats consuming groups is another important finding that needs further study.

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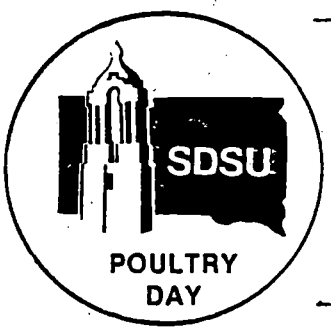
[1] Superintendent, Poultry Research Center and Professor Emeritus, respectively.

Table 1. Effect of Various Grains with Meat and Bone Meal on Egg Production

Treatment	H-D Prod, %	Feed/Day[a] g	Gm Egg 100 gm feed	Mortality %
	(25-65 wk of age)			
Corn-Soy	72.8	106	38	27.1
Corn-M&B	64.9	81	33	28.2
Oats-M&B	66.5	106	33	5.6
Wheat-M&B	75.9	101	36	23.6
Corn-Oats-M&B	73.7	100	38	10.6
Corn-Oats-Wheat-M&B	75.6	110	38	7.8

[a] Twenty-five - thirty-three week period only, overall there were no statistical differences.



CANOLA MEAL AS A PROTEIN SUPPLEMENT FOR LAYING HENS

C. Wendell Carlson[1] and A. B. Kashani[1]

Department of Animal and Range Sciences

POULTRY 85-3

Canola meal is obtained from a special strain of rapeseed developed by Canadian plant breeders to be low in erucic acid (an odd-number carbon chain fatty acid) and glucosinic acid, both of which produce undesirable effects in livestock and poultry. With the minimization of these factors, Canola could be a potential for supplying some of the protein needs in animal feeds, and already has become popular in the western Canadian provinces. Because of this it was deemed appropriate to consider Canola for egg production in studying protein sources at South Dakota State University.

Eight replicates of twelve 35-week old hens were fed each diet in a study to evaluate the use of Canola meal as the only protein supplement in 13, 15 and 17% protein diets. Sunflower and soybean meal were also compared with each other and to Canola meal. Lysine and methionine were made adequate in all diets according to NRC standards. Criteria were egg production, egg weight and albumen quality, feed intake and efficiency and mortality.

The data for egg production after five 4-week periods are shown in Table 1. The only significant affects were that of reduced performance with the 13% protein series. There were no significant differences evident due to protein source. Similarly, through eight periods (Table 2) there were no overall differences due to protein source, nor in the final standings was the difference due to protein level significant. An interaction is evident, in that with soybean or sunflower meal the low protein diets produced poorer performance, where the opposite was evident with Canola meal.

The data for feed conversion (Table 3) show that only the 13% protein diets were significantly poorer than the 15 or 17% protein diets. Though the higher fiber levels of sunflower and Canola meals would be expected to reduce performance, the differences were not significant. Mortality (Table 4) appeared to be lowest for sunflower meal and highest for the higher levels of Canola meal, but the differences were not significant.

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[1] Professor Emeritus and Superintendent, Poultry Research Center.

With adequate amino acid fortification these data indicate that either Canola, sunflower or soybean meal can be used for satisfactory performance of laying hens. No adverse effects on egg quality were noted.

Table 1. Effect of Protein Supplement and Protein Level of Egg Production, %

Protein Source	Dietary Protein Level - % 35-55 wks of age 17	15	13	Means
Soybean Meal	80.2	79.4	71.8	77.1
Sunflower Meal	78.1	76.2	75.2	76.5
Canola Meal	77.0	76.1	78.8	77.3
Means	78.4[a]	77.2[a,b]	75.2[b]	

[a,b] Values with unlike superscript are significantly different (P<.01).

Table 2. Effect of Protein Supplement and Protein Level on Egg Production, %

Protein Source	Dietary Protein Level - % 35-67 wks of age 17	15	13	Means
Soybean Meal	75.1	74.6	66.6	72.1
Sunflower Meal	74.2	71.6	70.3	72.0
Canola Meal	70.4	70.3	74.6	71.8
Means	73.2[a]	72.2[a]	70.5[a]	

[a] Protein source x level was significant (P<.1) for 8 period means. All other differences not significant.

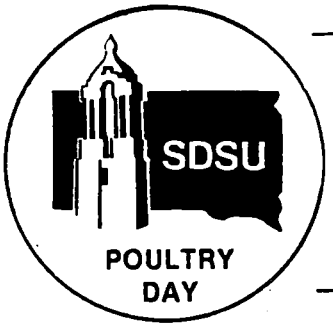
Table 3. Effect of Protein Source and Protein Level on Feed Conversion (g egg/g feed)

Protein Source	Dietary Protein Level - % 35-67 wks of age 17	15	13	Means
Soybean Meal	.40	.38	.36	.38
Sunflower Meal	.38	.37	.35	.37
Canola Meal	.37	.37	.37	.37
Means	.38[a]	.37[a,b]	.36[b]	

a,b Values with unlike superscript within an age group are significantly different ($P<.01$).

Table 4. Effect of Protein Source and Protein Level on Mortality, %

Protein Source	Dietary Protein Level -% 17	15	13	Means
Soybean Meal	10.6	8.6	15.0	11.5
Sunflower Meal	7.1	11.3	9.2	9.2
Canola Meal	16.6	14.7	9.4	13.6
Means	11.4	11.5	11.2	



DRIED COLOSTRUM FOR GROWING TURKEYS

Ali B. Kashani[1] and C. Wendell Carlson[1]

Department of Animal and Range Sciences

POULTRY 85-4

The importance of fresh whole colostrum for the young animal has long been recognized. Because of its content of antibodies and other possible immune-producing substances, colostrum enhances the young's growth performance and frequently aids in preventing some or much mortality. With the possible unavailability of antibiotics (that have been in use for over 35 years to enhance growth and survivability of turkey poults especially) other substances are being considered for their replacements. As examples, high levels of copper salts (providing upwards of 100 ppm copper) and several probiotics have been evaluated for this purpose. Dried colostrum is perhaps the latest additive to be so tested.

Levels of 2-1/2 and 5 lbs. of dried colostrum per ton of feed were fed to turkey poults to 4 weeks of age on normal diets as well as those made to be subnormal in calcium and in both calcium and phosphorus. The results are shown in Table 1.

With the control or good diet there appeared to be a real growth response due to the addition of both colostrum levels; however overall, the differences were not significant. Feed/gain values showed the same trends, but the differences were not significant. A disturbing factor was the very high rate of mortality even among the poults on the good diets.

A repetition of a portion of this study was therefore conducted with the results at three weeks shown in Table 2. There was no growth response evident, but the livability was much improved. It would appear that the previously encountered stress was avoided.

It seems therefore, that dried colostrum may have a place in turkey production when the stresses are severe. The combined effects of colostrum and antibiotics were not evaluated in these studies. The lack of major quantities of dried colostrum being available could limit its usefulness.

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[1] Superintendent, Poultry Research Center and Professor Emeritus.

Table 1. Effect of Calcium, Phosphorus and Colostrum Levels on Large White Turkey Poults (Experiment 1)

Treatments	Avg. Body Weight gm Initial	2 wks	4 wks	Avg. Feed:gain 2 wks	4 wks	Avg. % of Bone % DM	% Ash	% Mortality
1. Basal (1.2% calcium, .6% available P)	61	278	784	1.23	1.61	41.4	54.8	12.2
2. Basal + colostrum 1x (2 1/2 lbs/ton)	63	312	863	1.22	1.59	42.2	55.4	24.5
3. Basal + colostrum 2x (5 lbs/ton)	60	303	877	1.16	1.52	43.0	55.9	23.3
4. Low calcium (.6% calcium, .6% available P)	61	309	871	1.19	1.52	40.3	55.0	22.2
5. Low calcium + colostrum 1x	62	280	800	1.21	1.59	39.3	54.5	16.7
6. Low calcium + colostrum 2x	62	283	829	1.21	1.55	41.8	54.4	28.9
7. Low calcium, low P (.6% Ca, .3% available P)	59	220	435	1.32	1.57	39.3	48.0	87.8
8. Low Ca + low P + colostrum 1x	63	227	547	1.32	1.85	33.2	42.5	46.6
9. Low Ca + low P + colostrum 2x	62	249	561	1.23	1.51	33.2	43.6	40.0
Effect of Ca + P								
control	62	297^{a}	841^{a}	1.20^{a}	1.57^{a}	42.2^{a}	55.4^{a}	20.0^{a}
low Ca	62	290^{a}	833^{a}	1.21^{a}	1.55^{a}	40.4^{b}	54.6^{b}	22.6^{b}
low Ca + low P	61	232^{b}	514^{b}	1.29^{a}	1.64^{a}	34.1^{b}	43.9^{b}	58.2^{b}
Effect of colostrum								
no colostrum	60	269^{a}	697^{a}	1.25^{a}	1.56^{a}	40.6^{a}	53.9^{a}	40.7^{a}
1x colostrum	63	273^{a}	736^{a}	1.25^{a}	1.67^{a}	38.1^{a}	51.2^{a}	29.3^{a}
2x colostrum	61	278^{a}	756^{a}	1.20^{a}	1.52^{a}	39.8^{a}	52.4^{a}	30.7^{a}

[a,b] Values with unlike letter are statistically different.

[1] Normal protein starter diets adequate in all nutrients (NRC, 1977). There were 3 groups of six males fed each treatment.

[2] Fat free dry bone.

Table 2. Effect of Dried Colostrum on Turkey Poults (Experiment 2)

Treatment	3 wk wt.	Mort-ality	Feed/ Gain
	gm	%	
(As 1 - Exp. 1)	407	5.0	1.40
2 - 1&2-1/2 lb. colostrum/T	369	8.5	1.57
3 - 1&5 lb. colostrum/T	418	6.3	1.46
4 - as 7, low Ca and P	292	80.0	--
5 - 4+2-1/2 lb. colostrum/T	267	80.0	--
6 - 4+5 lb. colostrum/T	355	95.0	--

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY POULTRY DISEASE INVESTIGATIONS

[1]
M. W. Vorhies
Department of Veterinary Sciences

POULTRY 85-5

The South Dakota poultry industry may not be relatively large, and disease problems are minimal due to excellent preventative health programs available to the industry. The Animal Disease Research and Diagnostic Laboratory does provide a full service support system. Following is a list of diagnoses made from case submissions. The basic overall conclusion is that no serious epidemic disease processes occurred. Environmental house management is very important in controlling some infectious diseases of turkeys.

Body as a Whole	Chicken	Turkey	Other
Abscess			1 pheasant
Adenovirus Infection		2	
Amyloidosis	1		2 geese
Botulism			1 duck
Cannibalism	19	1	1 pheasant
Dehydration	9	2	
Emaciation	34		1 pheasant
Gout	4		
Health Evaluation, Normal		79	1 duck, 1 pheasant
Neoplasm	10		
Obesity	11		
Parasitism, Histomonas	1	2	
Peritonitis	31	1	
Septicemia, Erysipelothrix	1	1	
Septicemia, E. coli	2	27	1 pheasant
Septicemia, Pasteurella multocida		5	2 geese, 1 pheasant
Septicemia, Salmonella		50	1 goose, 1 pheasant
Septicemia, Staphylococcus	5	1	
Septicemia, Staphylococcus aureus	1	16	
Septicemia, Streptococcus	3		
Starvation		4	1 duck, 1 pheasant
Sudden Death, Idiopathic			2 duck, 2 pheasant
Toxicosis, Lead			2 geese
Trauma	4	1	1 duck
Tuberculosis	3		
Musculoskeletal			
Arthritis		14	

[1] Head of Department, Director, Diagnostic Laboratory

	Chicken	Turkey	Other
Arthritis, Staphylococcus aureus	1		1 duck
Foot-Abnormal	3		
Osteodystrophy	6	9	
Osteomyelitis		1	
Synovitis	1	1	
Respiratory			
Airsacculitis Complex	2	13	1 duck, 2 geese
Aspergillosis		11	1 goose
Coryza (Acaligenes faecalis)	1		1 goose
Infectious Bronchitis	1		
Lung-Pneumonia	3	1	
Lung-Pneumonia, Broncho			1 duck
Lung-Pneumonia, Pasteurella hemolytica			1 goose
Lung-Pneumonia, Pasteurella multocida		2	
Respiratory Infection, Idiopathic		1	
Respiratory Infection, Staphylococcus aureus	1		
Sinusitis		1	
Cardiovascular			
Aortic Rupture	1	12	
Pericarditis	3		
Round Heart Disease		1	
Hemic and Lymphatic			
Anemia, Aplastic	1		
Hemoprotozoan sp.			1 goose
Hemorrhage, Generalized	8		
Infectious Bursal Disease	1		
Neoplasm, Lymphoid Leukosis	140	1	
Neoplasm, Marek's Disease, Generalized	1		
Digestive			
Cloaca-Prolapse	2		
Crop-Mycosis		1	
Gizzard-Impaction	1		
Intestine-Enteritis, Coccidia	9		
Intestine-Enteritis, Enterovirus		2	
Intestine-Enteritis, E. coli		1	
Intestine-Enteritis, Idiopathic	3	10	
Intestine-Enteritis, Necrotic			1 goose
Intestine-Enteritis, Rotavirus		5	
Intestine-Enteritis, Salmonella		3	
Intestine-Impaction			1 goose
Intestine-Parasitism, Acanthocephalus			1 goose

	Chicken	Turkey	Other
Intestine-Parasitism, Coccidia		24	1 goose, 3 pheasant
Intestine-Parasitism, Hexamita		1	
Liver-Granuloma, E. coli	1		
Liver-Hepatitis	8	2	3 duck, 2 geese, 1 pheasant
Liver-Hepatosis		1	
Liver-Lipidosis	6	1	
Liver-Neoplasm	1		
Parvovirus	1		
Urogenital			
Blow-out	5		
Egg Production Decreased	3		
Internal Layer	10		
Kidney-Cyst (Polycystic)	1		
Kidney-Neoplasm	1		
Ovary-Neoplasm	1		
Ovary-Neoplasm, Ovaritis	1		
Oviduct-Cyst	1		
Oviduct-Impaction	4		
Oviduct-Rupture	1		
Nervous			
Encephalitis, Non-suppurative	6		
Encephalitis, Nutritional		2	
Encephalomalacia	1		
Marek's Disease, Neural	1		
Meningitis			1 goose
Meningitis, Suppurative			1 duck
Neurological Disorder	2	1	
Special Senses			
Eye-Conjunctivitis	1		

TEMPERATURE EFFECTS ON THE REQUIREMENTS FOR LAYERS

Craig N. Coon and Alfredo Peguri
Department of Animal Science
University of Minnesota

POULTRY 85-6

The environmental temperatures in the layer houses in the Midwest may range from 60 F to 90 F because of extreme cold weather in the winter and hot weather in the summer. Research suggests that cold temperatures increase the maintenance energy requirement of layers to increase body temperatures and hot environmental temperatures lower the maintenance energy requirement to enhance the elimination of body heat. Since feed consumption of layers is primarily controlled by their energy requirements the change in temperature drastically effects daily feed consumption. Alterations in feed intake of layers caused by changing temperatures create many problems for layer nutritionists because feed consumption information is important to provide optimum daily intakes of essential nutrients. The objectives of the research discussed in this paper were to determine the effect of environmental temperatures upon layer performance and also to develop information to assist in predicting feed intake of layers at different temperatures. The first experiment is for layers from 20 to 36 weeks of age and the second experiment is for layers from 36 to 65 weeks of age.

Fourteen hundred and forty DeKalb-XL Leghorn pullets, 18 weeks of age, were housed in six environmental rooms with each room containing two portable racks of cages that contains 60 cages per unit (120 cages). The six environmental rooms were maintained at temperatures of 61 F, 66 F, 72 F, 77 F, 82 F and 88 F. The relative humidity was maintained at 60% and the ventilation rate changed from 1.5 cfm per bird at 61 F to 6 cfm per bird at 88 F. The experimental diets consisted of 1200, 1250, 1300, and 1350 kcals of metabolizable energy per pound with nutrients formulated on a per therm basis to provide an equivalent amount of nutrients per therm in order to assure that all pullets received adequate levels of amino acids, minerals and vitamins. The Leghorn pullets were fed a 17% protein experimental pre-lay pullet diet from 18 weeks to 20 weeks of age prior to feeding. The two weeks helped each of the Leghorn pullets acclimate to the various temperatures. The body weights were determined every two weeks during the 16 week experiment and feed consumption was determined weekly. Egg production was charted each day and once a week all dietary treatments eggs were weighed for determination of egg weight differences.

The hen day egg production from hens housed in the six environmental rooms was equivalent for all temperatures (Figure 1). The mean egg weight for the four laying periods ranged from

a low 50.55 grams across all diets in the 88 F rooms up to 53.6 grams across all diets for layers housed at 61 F (Figure 1). The 3 gram increase in egg weight was due to the higher feed consumption of the birds housed at 61 F compared to birds housed at warmer temperatures. The hens housed at 61 F had a mean feed consumption per hen per day at 110 grams down to 88.4 grams of feed consumed per hen per day for hens housed at 88 F. The diets containing higher levels of energy (1350 kcals metabolizable energy per pound) produced higher caloric feed intake for all temperatures compared to the lower dietary calorie diets (Figure 3). The mean kcal consumed per hen day for hens housed in the 61 F rooms were 309 kcals and the hens housed at 88 F consumed 248 kcals per hen per day. The body weight gain of layers during the 16 week period was 333 grams across all diets for hens housed at 61 F and only 217 grams gain for hens housed at 88 F (Figure 2). Since the layers housed at 88 F produced the same hen day egg production as hens housed at 61 F and because of the low feed intake of hens housed at the high temperatures, the layers had an excellent feed utilization at the high temperatures. The grams of feed consumed per gram egg mass for hens housed in the room with 88 F is 2.11 compared to 2.51 grams feed consumed per gram egg mass for layers housed at 61 F. The low feed intake of layers housed in the warmer temperatures produce smaller egg size and this could be a detrimental factor when egg prices are significantly different between medium and large. The tremendous savings in feed cost in housing layers at warmer temperatures may very well offset egg size differences after layers have reached a larger size egg. Egg producers may need to increase feed consumption early in order to quickly increase egg size and then increase housing temperatures to help regulate feed intake and improve feed utilization.

The second experiment consisted of utilizing the same DeKalb layers (36 weeks of age) and housing layers at 65, 75 and 85 F environmental temperatures. The relative humidity was maintained at 60%. The layers housed in the environmental temperatures of 65, 75, and 85 F received 400 cfm air/room, 1000 cfm air/room and 1600 cfm air/room, respectively. Egg production was taken daily and feed consumption records determined every two weeks for seven 28-day periods. The eggs from each group were weighed once a week to determine temperature effect upon egg weights. The dietary formulas were continually adjusted for layers in each environmental temperature to provide equal essential nutrients per day for all layers.

The layer performance of hens housed at the three separate environmental temperatures are shown in table 1. Hen day egg production, egg weights, and egg mass were not affected by temperatures in this experiment. The feed consumption of layers housed at 65 F was approximately 4 pounds per 100 hens per day higher than at 85 F. The increased feed consumption also decreased the feed efficiency for the layers because layers housed at 65 F required 2.35 grams of feed per gram egg mass whereas hens housed at 85 F required 1.98 grams of feed per gram egg mass. The layers housed at 85 F also had a slight weight

gain during the 37 to 65 week period whereas birds housed at 65 F showed no increase in weight gain. The reason the layers housed at 65 F did not gain more additional weight from 36 to 65 weeks of age was because the layers had already gained a significant amount of weight from 20 to 36 weeks of age. The second experiment shows the tremendous advantage of housing layers at warmer temperatures because of the decrease in the feed consumption which greatly improved feed efficiency. A nutritionist must formulate for this decrease in feed consumption and provide the same amount of nutrients per day. The main reason layers can be more efficient with high temperatures is because of the lower maintenance energy requirement thus allowing more nutrients to be utilized for the production of eggs. These two experiments combined show the need to increase feed consumption early to increase egg size and then the advantages are to increase temperatures and decrease feed consumption to maintain an improvement in feed efficiency for the remainder of the laying cycle.

Table 1. The Performance of Hens Housed at Different Temperatures From 37 to 65 Weeks of Age

	Temperatures (F)		
	65	75	85
Hen day egg production, %	83.0	84.7	84.5
Egg weights, g	58.7	58.3	58.5
Egg mass, g	48.7	49.4	49.4
Feed consumption			
(g/hen/day)	114.4	106.2	97.6
(lbs/100 hens/day)	25.2	23.4	21.5
Feed efficiency			
(g feed/g egg mass)	2.35	2.15	1.98
(lbs feed/dz. eggs)	3.64	3.31	3.05
Weight gain, g	- 6.4	10.9	65.4

Figure 1. EFFECT OF TEMPERATURE (61-88°F) ON PERFORMANCE OF XL-DEKALB WHITE LEGHORN HENS FROM 20 TO 36 WEEKS OF AGE

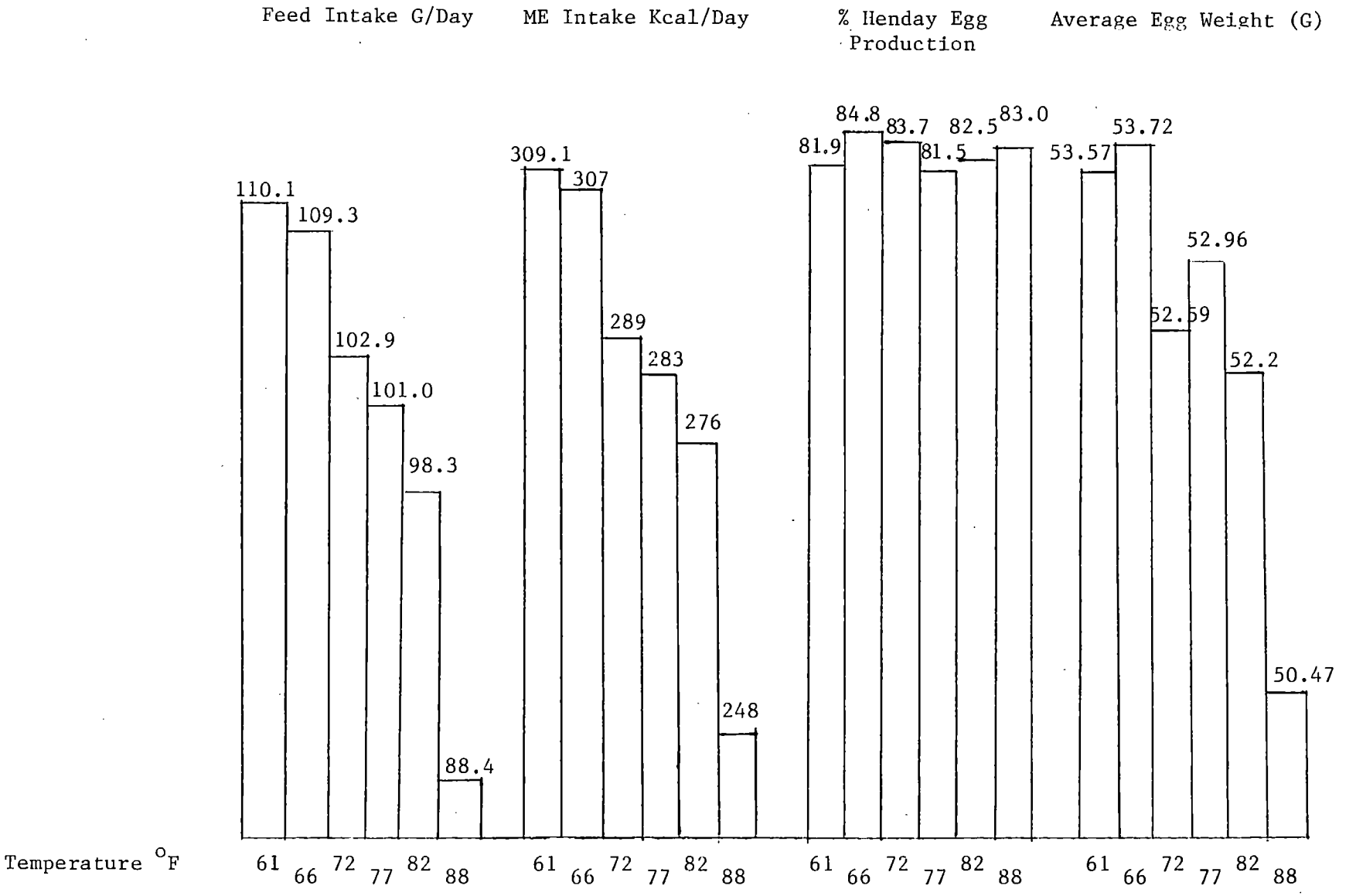


Figure 2. EFFECT OF TEMPERATURE (61-88°F) ON PERFORMANCE OF XL-DEKALB WHITE LEGHORN HENS FROM 20 TO 36 WEEKS OF AGE

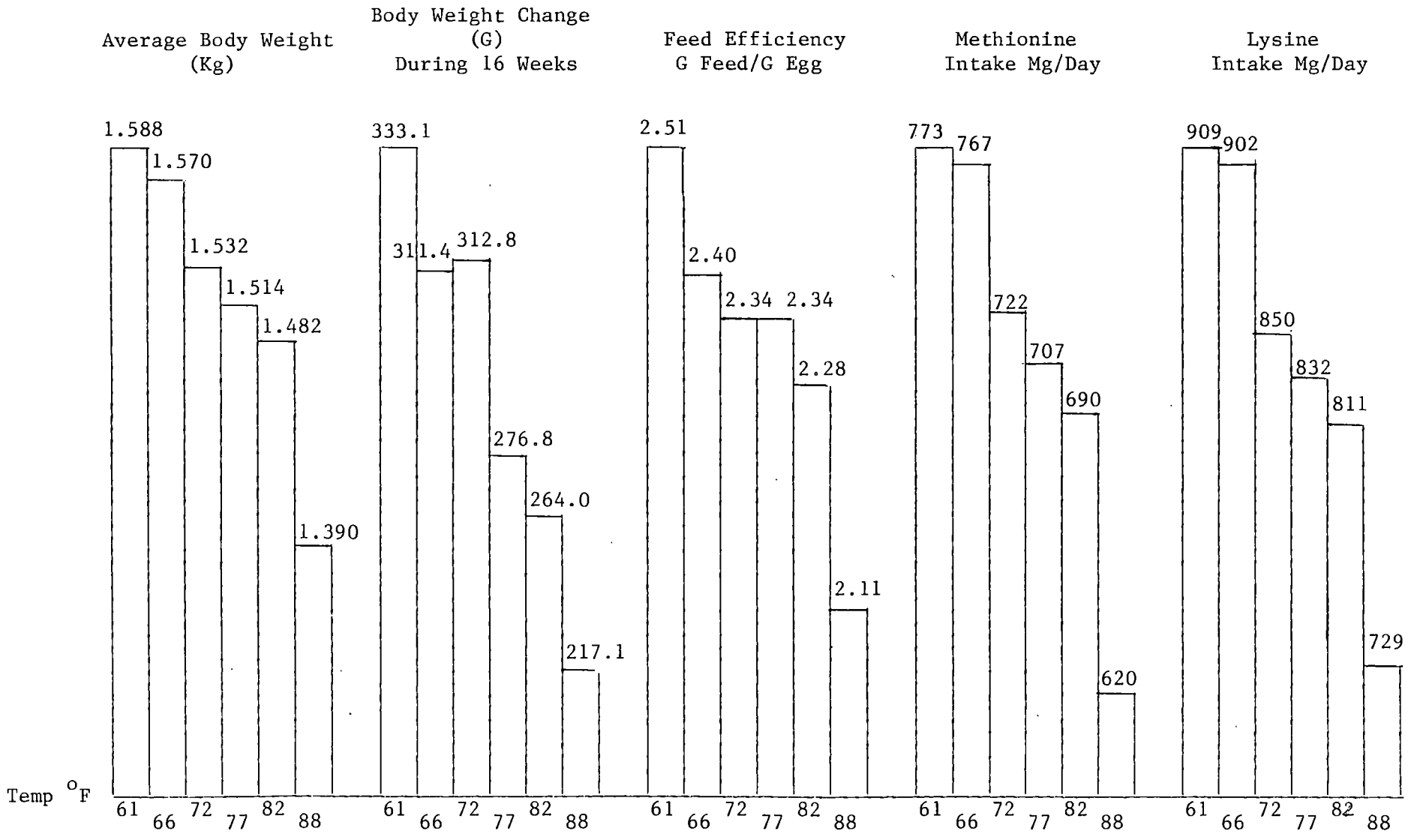


Figure 3. EFFECT OF ENERGY (2645-2976 Kcal/Kg) ON PERFORMANCE OF XL-DEKALB WHITE LEGHORN HENS FROM 20 TO 36 WEEKS OF AGE

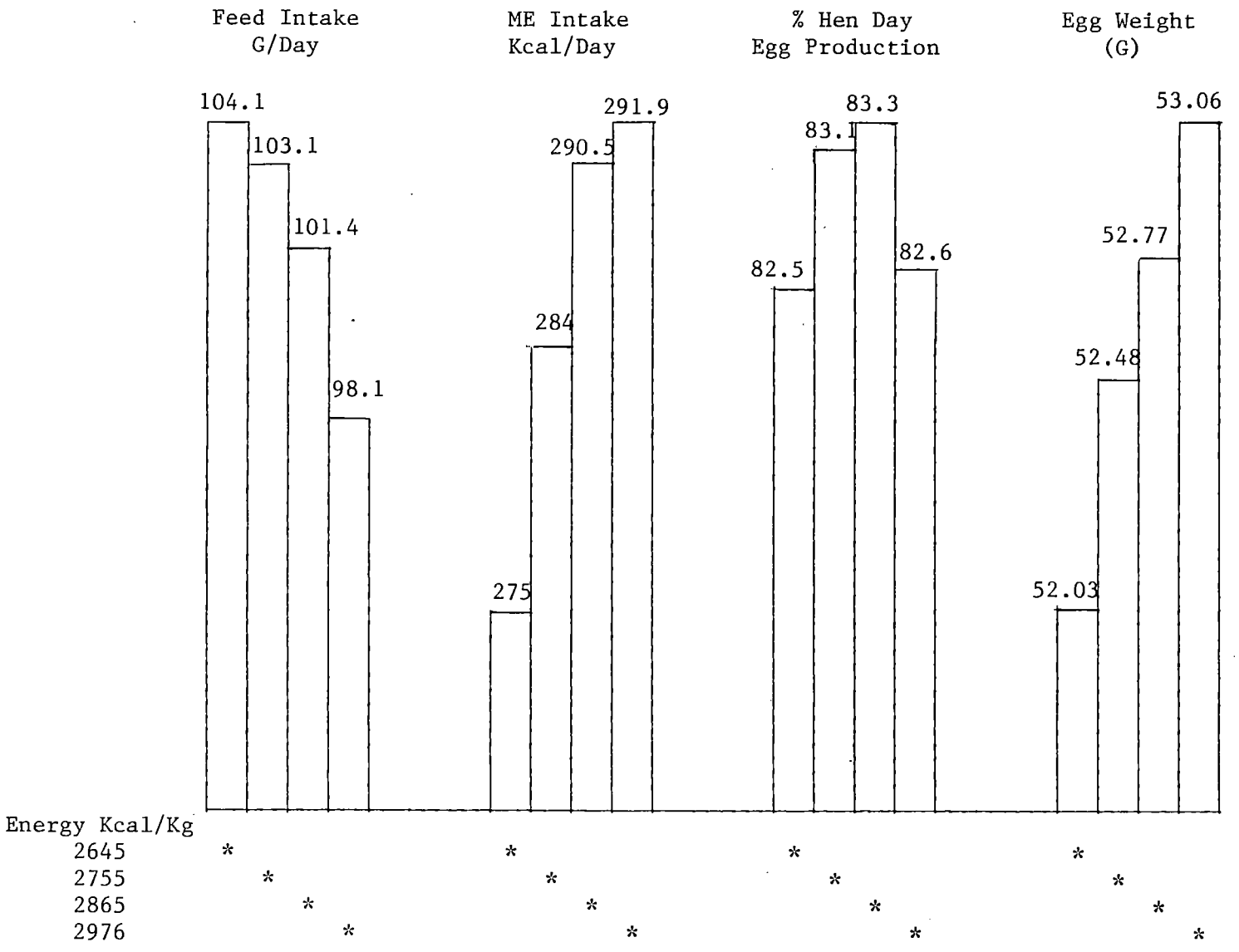
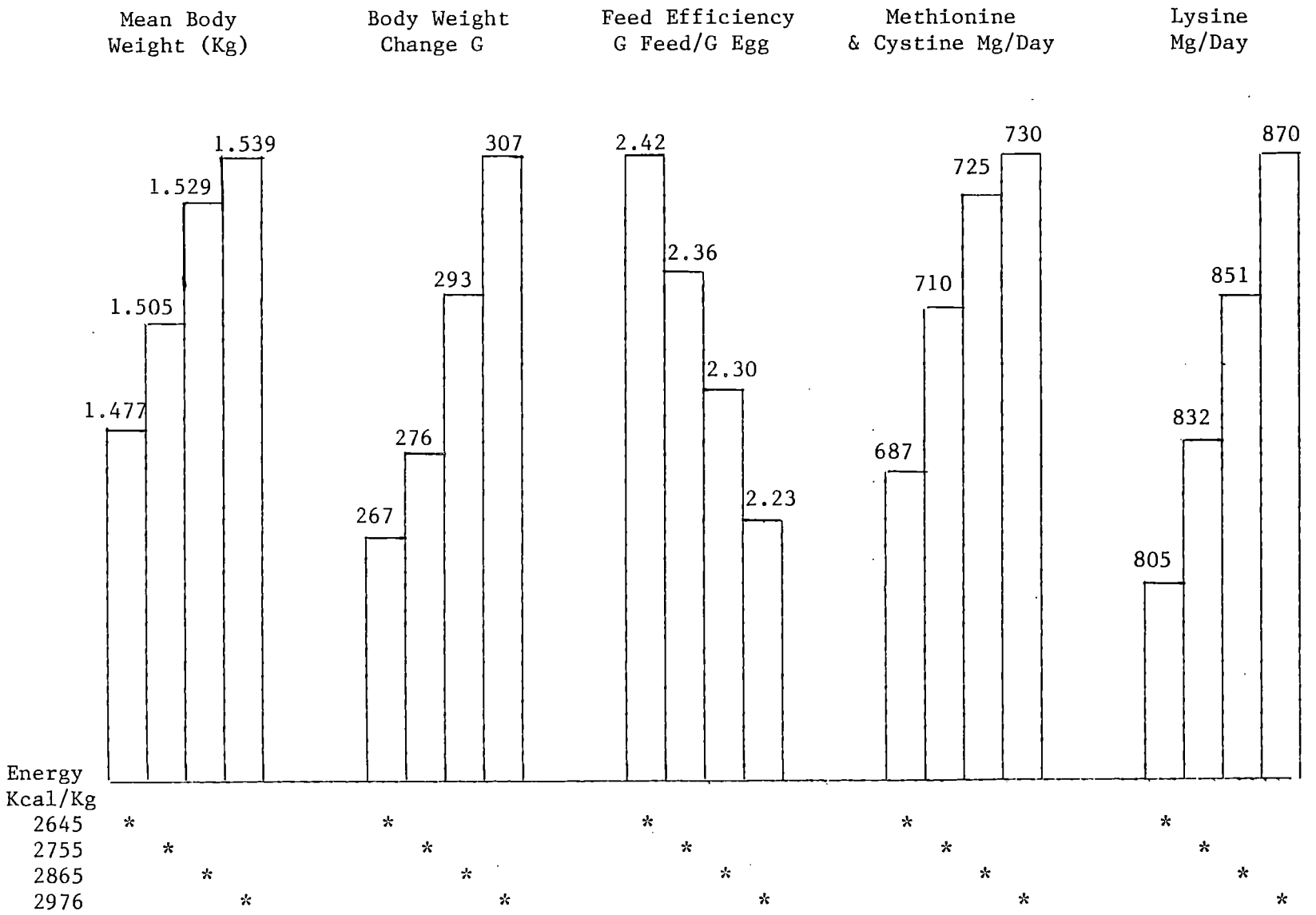
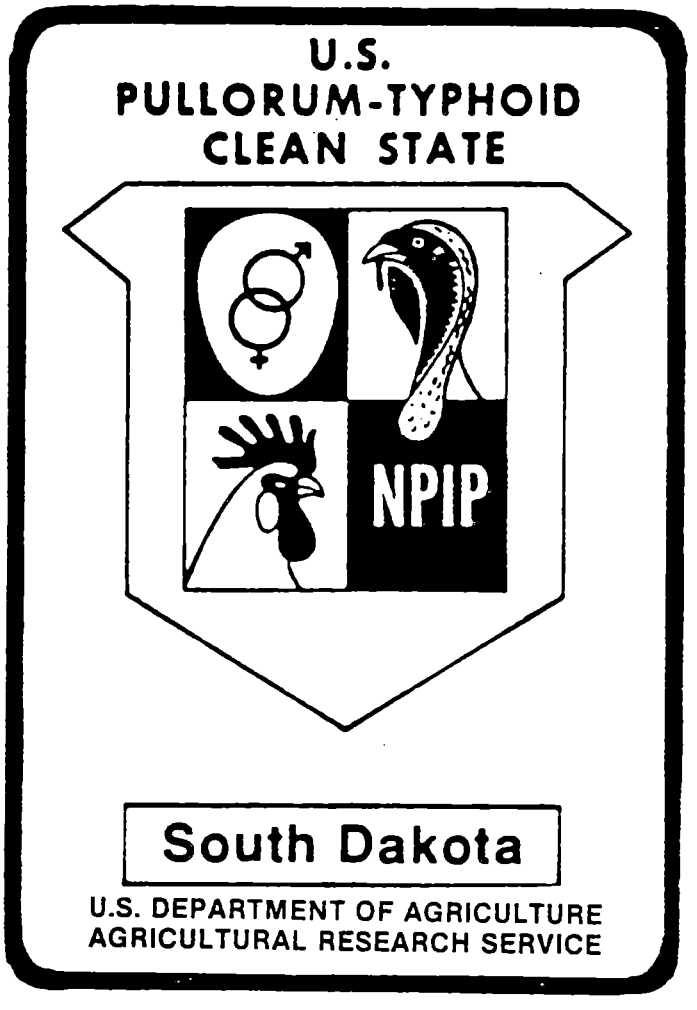


Figure 4. EFFECT OF ENERGY (2645-2976 Kcal/Kg) ON PERFORMANCE OF XL-DEKALB WHITE LEGHORN HENS FROM 20 TO 36 WEEKS OF AGE



South Dakota
Poultry Industries Association
Annual Report

From July 1, 1984 to June 30, 1985



SOUTH DAKOTA POULTRY INDUSTRIES

ANNUAL REPORT

C. Wendell Carlson[1]

POULTRY 85-7

Activities and Awards

During the year, the Association sponsored several projects to stimulate interest in the poultry area. Some of these were:

1. Helped plan and co-sponsor the 16th Annual Poultry Day in Brookings, November 1, 1984.
   An "Honorary Poultryman of the Year" award went to Mr. Marlin Schiltz of Sisseton, South Dakota.
2. Medals went to 4-H members for top poultry demonstrations at the state level.
3. Sponsored a booth at the Midwest Poultry Convention, Minneapolis, MN February 20-22, 1985 and at the South Dakota Home Economics Convention in Pierre, April 25-26, 1985.
4. Held membership in the Ag Unity Group and Livestock Expansion Foundation.
5. Continued a cooperative agreement with the American Egg Board for egg promotion.
6. Sponsored a brunch at the S.D. Vocational Educational Association at Rapid City in August.
7. Sponsored a booth at the South Dakota State Fair in September.
8. Sponsored a demonstration at the Brown County Fair in Aberdeen, at a Food Service Workshop in Elk Point and at the Sioux Empire Fair in Sioux Falls in August.
9. Hired Kris Brockhoft, a graduate of SDSU in Home Economics Education to continue egg and turkey promotion work in South Dakota succeeding Jayne Johnson Cutler. Kris was assisted at the State Fair by Shirin Kashani. Jayne and Kris promoted eggs and turkeys in numerous schools and women's groups in the state.

Introduction

During the year 1984-85, operators of 10 hatcheries, 8 chick stores and 2 individual flockowners cooperated under the National Poultry Improvement Plan regulations. In addition, there were commercial hatcheries and colonies that did not participate in the National Plans program. All hatcheries and chick stores were supervised by the South Dakota State Livestock Sanitary Board.

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[1] Secretary-Treasurer

Hatching egg capacity of 10 hatcheries in the National Poultry Improvement Plan totaled 1,284,340. Thirteen National Plan flocks containing 39,092 breeders were supervised under National Plan regulations. In addition to this, 3 flocks containing 2,741 breeders were supervised by the Livestock Sanitary Board. All breeders qualified for a Pullorum-Typhoid Clean rating.

C. Wendell Carlson served as Secretary-Treasurer of the Association and Phillip E. Plumart audited the books.

Delores Starkenburg served as office secretary to the Secretary-Treasurer.

The 49th Annual Meeting was held in Brookings on November 1, 1984.

1984-85 Directors

C. Wendell Carlson, Sec.-Treas.
SDSU Department of Animal and Range Sciences
Brookings, SD

Producer-President
Dale Borchard, (2nd yr.)
Redfield, SD

Industry-Vice President
Harold Sankey (2nd yr.)
Sioux Falls, SD

Hatchery Director
Marion Holter (27th yr.)
Platte, SD

Hatchery Director
Marvin Mueller (34th yr.)
Tripp, SD

Industry-Director
Dr. Darwin Britzman (15th yr.)
Sioux Falls, SD

Turkey-Director
Barry Mack (1st yr.)
Watertown, SD

Producer-Director
Martin Muchow (16th yr.)
Sioux Falls, SD

U.E.P. Liaison Director
Oscar Nygaard
Clear Lake, SD

Professor Phillip E. Plumart
SDSU Extension Service
Brookings, SD

Duane Hughes, DVM
SD Livestock Sanitary Board
Pierre, SD

Mahlon Vorhies, DVM
SDSU Veterinary Science Dept
Brookings, SD

SOUTH DAKOTA HATCHERIES THAT ARE PARTICIPATING
IN THE NATIONAL POULTRY PLAN FOR
THE FISCAL YEAR 1984-85

Hatchery Name & Address	Capacity	Breeds Offered
Chickens & Turkeys -- Meat and Egg Types		
Hatcheries		
Inman Hatchery, Aberdeen 57401	32,000	s22w, b10, d9, dh, A45, C2
Lakeview Hy., Clear Lake 57226	462,000	s20w, t20
Nase Hatchery, Armour 57313	160,000	b10, r209, s22w, t9, t17t3, t17t9, t17t1
Sunshine Hy., Watertown 57201	216,000	s10w, s8w, s9w, t11, t19t1
Tyndall Hatchery, Tyndall 57066	54,000	t25, r, s22w
Wenk's Hatchery, Madison 57042	121,000	hd, s8w, t20
Dealers		
Axtell Poultry Farm, Sioux Falls		s8w
D & J Pullets, Sioux Falls 57101		s15b, s15w
Dakota Best, Inc., Redfield 57469		s15w, t
Gurney's, Yankton 57078		b, d, e, w
Mueller's Hatchery, Tripp 57376		t25, r, s22w
Platte Hatchery, Platte 57369		s15w, hd, r
Sunshine Hatchery, Flandreau 57028		s3w, ch
Soper's Hatchery, Gettysburg 57442		s, t
Waterfowl, Game Birds and Exhibition Birds		
Hatcheries		
Beverly's Goose Hy., Howard	22,800	y1, y3
Inman Hatchery, Aberdeen 57401	56,200	x2, x3, y1, y3, y4y2, z27
International Waterfowl, Ipswich	91,240	x2, x3, y1, y3
SD Pheasant Co., Canton 57013	15,500	z27
Shiltz Foods Inc., Sisseton	53,600	y17, y18, y19
Independent Flock		
Reynold Loecker, Yankton 57078		w
Allyn Frerichs, Brookings 57006		w

Key to Letters Listed After Hatchery
National Poultry Improvement Plan

a - White Leghorns

b - Rhode Island Reds

b10 - Welp

c - Barred Plymouth Rock

d - White Plymouth Rocks

d9 - Welp

e - New Hampshire

h - Cornish

r - Other Large Breeds

r209 - California White

s - Egg Production Stocks
No Variety Designation
"b" designates brown eggs
"w" designates white eggs

s1w - white
s3w - Babcock
s8w - DeKalb
s9w - Euribrid
s10w - H & N
s15b - Hyline
s15w - Hyline
s20w - Shaver
s22w - Welp

t - Meat Production Stocks
No Variety Designations

t1 - Arbor Acres
t2 - Brown
t3 - Cobb
t9 - Hubbard
t11 - Indian River
t17 - Peterson
t19 - Ross
t20 - Shaver
t25 - Welp

Waterfowl, Exhibitors
Poultry, Gamebirds

n - game chickens
r - other large breeds
w - bantams
x - ducks
y - geese
z - pheasants

Turkeys

A45 - Broad Breasted
Bronze Marcum
C2 - Broadwhite

The hatcheries listed are voluntarily participating in the National Poultry Improvement Plan work which is administered by the South Dakota Poultry Industries Association in cooperation with the U.S. Department of Agriculture, Animal and Plant Health Inspection Services (APHIS), Veterinary Service, and the South Dakota State Livestock Sanitary Board.

The main objectives of these programs are to improve the breeding and production qualities of poultry and to reduce losses from hatchery disseminated diseases.

Products from the hatcheries and dealers listed carry a U.S. Approved, Pullorum-Typhoid Clean rating.

PAST AND PRESENT PARTICIPATION STATUS OF SOUTH DAKOTA HATCHERIES IN THE NATIONAL POULTRY IMPROVEMENT PLAN AS ADMINISTERED BY THE SOUTH DAKOTA POULTRY INDUSTRIES ASSOCIATION

Year	Number of Hatcheries	U.S. Approved U.S. Tested	U.S. Tested	U.S. Approved U.S. Tested	U.S. Approved U.S. Controlled	U.S. Approved U.S. Passed	U.S. Approved U.S. Clean	Egg Capacity	No. of Flocks	No. Breeders Retained	Av. Flock Size
1941	34	13	1	19				1,804,500	802	149,990	187
1942	35	6	1	19	8			2,408,700	894	196,082	212
1943	41	4		27	9			4,447,876	930	216,864	232
1944	39			23	15			2,616,966	979	230,283	235
1945	33			15	18			2,380,500	836	192,314	230
1946	39			15	21	3		2,616,000	1,037	239,336	231
1947	46			19	23	4		3,205,480	1,147	270,774	236
1948	47			4	36	7		3 453,040	966	237,398	240
1949	48			1	35	12		3,562,240	1,069	247,652	232
1950	58				46	12		4,824,000	1,388	366,428	264
1951	55				37	18		4,381,040	1,141	300,973	263
1952	57				35	22		4,650,000	1,252	337,202	269
1953	51				21	23	1	4,753,440	1,073	301,456	281
1954	48				17	31		4.601,640	1,058	302,045	285
1955	48					44	4	4,549,000	785	275,833	351
1956	48					35	13	4,695,140	931	290,017	310
1957	49					20	29	4,818,540	810	277,234	341
1958	50					16	34	4,685,400	711	256,080	360
1959	51					9	42	4,857,360	622	247,930	398
1960	47					4	43	4,719,560	525	237,549	452
1961	47						47	4,364,440	464	239,910	517
1962	46						46	4,520,920	413	212,250	514
1963	43						43	4,299,960	341	184,315	543
1964	40						40	4,129,360	287	171,026	596
1965	33						33	3,756,240	255	149,854	588
1966	37						37	3,619,920	211	149,354	709
1967	46						46	3,737,220	276	169,048	612
1968	47						47	3,707,780	236	148,583	680
1969	43						43	3,400,960	178	116,219	653
1970	32						32	2,773,580	169	115,500	683
1971	36						36	2,530,720	137	118,896	868
1972	23						23	2,094,420	87	92,999	1,069
1973	24						24	1,942,220	70	62,351	891
1974	19						19	1,995,720	74	66,854	903
1975	19						19	1,324,820	74	59,870	809
1976	16						16	1,709,000	54	58,205	1,078
1977	17						17	1,084,200	43	55,112	1,282
1978	16						16	1,006,200	39	51,591	1,323
1979	16						16	1 017,200	35	42,471	1,213
1980	16						16	1,514,000	33	37,900	1,148
1981	11						11	1,500,200	42	37,725	898
1982	11						11	1,224,200	16	31,665	1,979
1983	10						10	1,302,100	18	31,055	1,725
1984	10						10	1,276,300	23	39,574	1,721
1985	10						10	1,284,340	13	39,092	3,007

NATIONAL PLAN PARTICIPATION TEN YEAR SUMMARY OF BREEDS AND PULLORUM REACTION

Number of Breeders Retained in Breeding Flocks by Breed

Year	Leghorn Type	White Rock	Egg Prod. Stock	Meat Prod. Stock	Cal. Gray x Leg.	Other Crosses	Other Chickens	Ducks & Geese	Pheasants
1974	13,126	1,639	10,774	9,789	9,123	1,863	96	6,834	1,931
1975	27,239	2,668	5,713	6,375	9,731	0	1,261	6,883	115
1976	33,193	136	7,231	1,585	5,550	87	1,898	8,102	418
1977	33,850	230	3,840	3,600	2,624	245	2,912	7,661	2,200
1978	32,050	295	2,960	3 725	500	70	2,150	6,691	3,150
1979	14,500	120	2,995	650	500	100	2,895	7,261	1,900
1980	20,800	325	0	5,425	1,500	550	0	6,800	2,500
1981	24,100	950	1,075	0	0	2,100	100	7,700	1,700
1982	18,000	700	0	425	475	3,180	0	7,385	1,500
1983	12,275	605	0	0	3,190	0	0	13,485	1,500
1984	14,550	600	0	0	2,675	0	0	20,089	1,660
1985	14,850	0	0	0	1,925	0	0	19,779	2,538

Percent of Total Birds in each Breed

1974	23.8	3.0	19.5	17.7	16.5	3.4	.2	12.4	3.5
1975	45.5	4.5	9.5	10.6	16.3	.0	2.1	11.5	.2
1976	57.0	.2	12.4	2.7	9.5	.1	3.3	13.9	.7
1977	61.0	.4	6.9	6.5	4.8	.4	5.3	13.9	3.9
1978	62.0	.6	5.7	7.2	1.0	.1	4.2	13.0	6.1
1979	34.1	.3	7.7	1.5	1.1	.2	6.8	17.0	4.5
1980	54.9	.9	0.0	14.3	4.0	1.5	0.0	17.9	6.5
1981	63.8	2.5	2.8	0	0	5.6	0.3	20.4	4.5
1982	56.8	2.2	0.0	1.3	1.5	10.0	0.0	23.3	4.7
1983	39.5	1.5	0.0	0	10.3	0	0.0	43.4	4.8
1984	36.7	1.5	0.0	0	6.8	0	0.0	50.8	4.2
1985	37.9	0	0	0	4.9	0	0	50.5	6.4

No reactions for over 10 years

N. P. I. PLAN HATCHERY & INDIVIDUAL FLOCK PARTICIPATION

TESTING IN HATCHERIES WITH FLOCKS AND INDIVIDUAL FLOCKS

Hatchery No.	No. Flocks	No. Birds Tested	No. Reactors	No. Retained as Breeders
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	1	0	0	4,400
5	2	0	0	4,500
6	1	0	0	3,824
7	1	100	0	14,300
8	1	0	0	2,538
9	5	788	0	2,475
10	2	0	0	7,055
Total	13	888	0	39,092

NON-PLAN HATCHERIES THAT WERE SUPERVISED UNDER SOUTH DAKOTA LIVESTOCK SANITARY BOARD

11	1	0	0	1,161
12	1	0	0	900
13	1	0	0	680
Total	3	0	0	2,741

SUMMARY OF ALL WATERFOWL, AND PHEASANTS THAT WERE RETAINED IN BREEDING FLOCKS IN THE STATE AND SUPERVISED

	No. Flocks	Natl. Plan Supervision	No. Flocks	Non-Plan Supervision	Total
Ducks	2	4,380	0	0	4,380
Geese	4	15,399	2	1,580	16,979
Pheasants	1	2,538	1	1,161	3,699
Totals	7	22,317	3	2,741	25,058

THE STATE INSPECTION STAFF

Under the authority of South Dakota Livestock Sanitary Board Regulation #17, the Board started supervising Pullorum-Typhoid control work in the state on July 12, 1965. The regulations are now Chapter 38B 1301-1339 of the South Dakota Rules under authority of SDCL 40-3-9 and 40-2-14.

Six men were assigned to poultry along with their other duties during 1984-85. These men were:

Dr. Edward Andries, Aberdeen
Dr. Kermit Johnson, Rapid City
Mr. LeRoy Kayser, Mitchell
Dr. Ralph Palmer, Parkston
Mr. Elwyn Saugstad, Huron
Dr. D. K. Thorpe, Pierre

The Secretary-Treasurer of the association, C. Wendell Carlson, spent time in the field consulting with hatcherymen and allied industry during the year. Several hatchery and chick store visits were made.

FINANCING THE SOUTH DAKOTA POULTRY INDUSTRIES ASSOCIATION

The schedule of fees is as follows:

Hatchery Members

Hatchery dues

No incubator cap. (dealers & chick stores)	$ 5.00
Up to 34,999 egg capacity	5.00
35,000 - 99,999 egg capacity	10.00
100,000 - 249,999 egg capacity	20.00
250,000 and up	25.00

Chick sales fee:
35 /1000 straight run or 70 /1000 pullets, chicks ducks, geese, pheasants, etc., sold

Producer Members

Pullet Grower:

Capacity:	
0 - 10,000	$10.00
10,001 - 20,000	15.00
20,001 & up	20.00

Layer Flockowner:

Capacity:	
0 - 5,000	$ 5.00
5,000 - 10,000	15.00
10,001 - 20,000	20.00
20,001 - 50,000	30.00
50,001 & up	40.00

Allied Industry Members $35.00

Flock Selecting & Testing Certificate Fee $1.10

Accounting: Mr. Phillip E. Plumart will audit the books at the close of the fiscal year; a report will be sent to the directors and the audit will be open for review by a committee appointed by the President. A copy of the audit report will be sent to anyone of the membership upon request.

SOUTH DAKOTA POULTRY INDUSTRIES ASSOCIATION
MEMBERSHIP LIST 1984-85

Hatchery Members

Beverly's Hatchery, Howard
Inman Hatchery, Aberdeen
Intern. Waterfowl, Ipswich
Lakeview Hatchery, Clear Lake
Nase Hatchery, Armour
Schiltz Foods, Sisseton
S. D. Pheasant Co., Canton
Sunshine State Hy., Watertown
Tyndall Hatchery, Tyndall
Wenk's Hatchery, Madison

Chick Store Members

Axtell Poultry Farm, Sioux Falls
Dakota Best, Inc., Redfield
D & J Pullets, Sioux Falls
Gurney's Hatchery, Yankton
Mueller's Hatchery, Tripp
Platte Hatchery, Platte
Soper's Hatchery, Gregory
Sunshine Farm Supply, Flandreau

Individual Members

Reynold Loecker, Yankton
Allyn Frerichs, Brookings

Allied Industry Members

GTA Feeds, Sioux Falls
Golden Sun Feeds, Sioux Falls
Harry's Station, Redfield
Hubbard Milling Co., Watertown
Hy-Line Chicks of Spencer, Spencer, IA
Hy-Line Indian River Co., Johnston, IA
Vineland Laboratories, Wheatland, IN
Zip Feed Mills, Sioux Falls

Turkey Grower Members

Cloverleaf Colony, Howard
Gracevale Colony, Delmont
Gracevale Colony, Winfred
Greenwood Colony, Delmont
J & J Turkey Farm, Parkston
Lake View Colony, Lake Andes
Maxwell Colony, Scotland
Millbrook Colony, Mitchell
New Springs Colony, Ethan
Oaklane Colony, Alexandria
Pleasant Valley Colony, Flandreau
Poinsett Colony, Estelline
Rockport Colony, Alexandria
Roland Colony, Bushnell
Rosedale Colony, Mitchell
Spring Lake Colony, Arlington
Tschetter Colony, Olivet
Wolfcreek Colony, Olivet

Producer Members

Martin Muchow, Sioux Falls

LIST OF SOUTH DAKOTA HATCHERIES 1984-85

Beverly's Goose Hatchery, Howard, SD 57349
Clark Colony, Raymond, SD 57258
Countryside Wild Bird Farm, Lennox, SD 57039
Inman Hatchery, Aberdeen, SD 57401
International Waterfowl Co., Ipswich, SD 57451
Lakeview Hatchery, Clear Lake, SD 57226
Nase Hatchery, Armour, SD 57313
Schiltz Foods, Inc., Sisseton, SD 57262
South Dakota Pheasant Company, Canton, SD 57013
South Dakota State University, Brookings, SD 57007
Spink Country Colony, Frankfort, SD 57440
Sunshine State Hatchery, 125 N. Maple, Watertown, SD 57201
Taylor's Hatchery, 510 W. Melgaard Rd., Aberdeen, SD 57401
Tyndall Hatchery, Box 24, Tyndall, SD 57066
Wenk's Hatchery, 208 S. Harth Street, Madison, SD 57042
West & Owens Pheasant Farm, Inc., White Lake, SD 57383

LIST OF SOUTH DAKOTA CHICK STORES 1984-85

Axtell Poultry Farm, Rt 1, Box 122, Sioux Falls, SD 57101
Crossman Hatchery, Miller, SD 57362
D & J Pullets, RR 3, Box 159, Sioux Falls, SD 57101
Dakota Best, Inc., Box 311, Redfield, SD 57469
Don's Feed & Seed, Colman, SD 57017
Don's Produce & Spraying, Centerville, SD 57014
Ed's Produce, 301 3rd St., Dell Rapids, SD 57022
Grapes Produce, Carthage, SD 57232
Gurney's, Yankton, SD 57078
Huron Grain & Feed, Huron, SD 57350
Mueller's Hatchery, Tripp, SD 57376
Platte Hatchery, Platte, SD 57369
Quinn Produce & Hatchery, 126 E. 2nd St., Winner, SD 57580
Rapid Valley Hatchery, RR 2, Box 159R, Rapid City, SD 57701
Schramm Hatchery, Winner, SD 57580
Soper's Hatchery, Gettysburg, SD 57442
Soper's Hatchery, Gregory, SD 57533
Spencer Pheasant Farm, Spencer, SD 57374
Sunshine Farm Supply, Inc., Flandreau, SD 57028
Wessington Livestock Supply, Wessington, SD 57381

PARTIAL LIST OF SOUTH DAKOTA LAYER FLOCKOWNERS

Randy Byington, Bridgewater, SD 57319
Wallace Cramer, Freeman, SD 57029
Robert Erickson, Platte, SD 57369
Ron Fiala, Hamill, SD 57534
Allyn Frerichs, RR 1, Box 66, Brookings, SD 57006
Willie Kohen, Marion, SD 57043
Monte Kolbo, Groton, SD 57445
Reynold Loecker, RR 4, Box 131, Yankton, SD 57078
Martin Muchow, Sioux Falls, SD 57106
Arlon Ortman, Marion, SD 57043
Marv Roesler, Hurley, SD 57036
Francis Stadleman, Parkston, SD 57366
Bud Wenk, Madison, SD 57042
Wieczorek Bros., Mt. Vernon, SD 57363
Wally Wieczorek, Mt. Vernon, SD 57363

COLONIES IN SOUTH DAKOTA WITH LAYERS

Blumengard Colony, Wecota, SD 57480
Bon Homme Colony, Herman Wurtz, Tabor, SD 57063
Cedar Grove Colony, Harry Hofer, Platte, SD 57369
Cloverleaf Colony, Henry Wipf, Howard, SD 57349
Deerfield Colony, Tom Stahl, Leola, SD 57456
Glendale Colony, Zach Waldner, Frankfort, SD 57440
Gracevale Colony, Peter Wipf, Winfred, SD 57076
Greenwood Colony, Josh Wurtz, Delmont, SD 57330
Huron Colony, Ted Waldner, Huron, SD 57350
Jamesville Colony, Ben Wurtz, Utica, SD 57067
Long Lake Colony, Daniel Kleinsasser, Westport, SD 57481
Maxwell Colony, Donald Wipf, Scotland, SD 57059
Millerdale Colony, Mike Waldner, Miller, SD 57362
Pearl Creek Colony, Paul Waldner, Iroquois, SD 57353
Pembrook Colony, Ed Hofer, Ipswich, SD 57451
Plainview Colony, Andy Stahl, Ipswich, SD 57451
Platte Colony, Jonathan Waldner, Academy, SD 57310
Rockport Colony, John Gross, Alexandria, SD 57311
Rosedale Colony, Daniel Kleinsasser, Mitchell, SD 57301
Spink Colony, Mike Waldner, Frankfort, SD 57440
Spring Lake Colony, Simon Decker Jr., Arlington, SD 57212
Spring Valley Colony, Joe Waldner, Wessington Springs, SD 58382
Thunderbird Colony, David Stahl, Norbeck, SD 57464
Tschetter Colony, Paul Hofer, Olivet, SD 57052
White Rock Colony, Joe Kleinsasser, White Rock, SD 57277
Wolf Creek Colony, Henry Decker, Olivet, SD 57052