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HATCHABILITY STUDIES ON EGGS AFTER TREATMENT WITH NITROGEN GAS

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Comparative studies were made to find out the hatchability results of White Leghorn eggs enclosed in nitrogen flushed polyethylene bags, air filled polyethylene bags and unpacked eggs. Four lots of eggs were stored for 4, 3, 2 and 1 weeks at room temperature (58-68° F) and 72 to 75 per cent relative humidity.

Highest hatchability percentage was recorded in eggs enclosed in nitrogen flushed polyethylene bags for all storage periods and lowest in unpacked (control) eggs. Highly significant differences ($P<0.01$) were observed between different storage periods. A reduction in the hatchability took place as the storage period was prolonged. The loss of weight was greater in unpacked eggs. Tne number of dead germs was lowest in eggs enclosed in nitrogen flushed polyethylente bags and highest in unpacked eggs.

INTRODUCTION

Prolonging of preincubation holding periods of hatching eggs is of great importance to both poultry breeders and commerical hatcharies as it facilitates the reproduction of stock. This also enables the poultry breeders to obtain flocks of same age thus reducing the environment variance associated with numerous broods. One of the factors in cost of chick production is the large number of eggs which fail to hatch. Jull (1938) estimated that approximately 30 per cent eggs placed in the commercial incubators fail to hatch. Card (1961) found that storage period is one of the important factors that lowers the hatchability of incubated eggs.

The object of the investigation reported in this paper was to find out whether hatchability of eggs can be further improved by storing them in nitrogen atmosphere in closed polyethylene bage under prevailing environmental conditions.

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MATERIALS AND MEHODS

Two hundred and eighty eight eggs of White Leghorn layers were collected in four lots designated as A, B, C and D having 72 eggs in each lot at weekly intervals. The eggs in each lot were randomly assigned to nine groups (experiment units) of eight eggs. In lot A, three random groups were packed in polyethylene bags flushed with nitrogen gas. Another three groups were packed in polyethylene bags having an atmosphere of air. The remaining three groups were kept unpacked at room temperature to serve as control. All the eggs of lot A were stored for four weeks at room temperature ranging from 58 to 68°F and relative humidity of 72 to 75 per cent before incubation. The eggs in lots B, C and D were similarly treated and were stored for a period of three, two and one week respectively befor incubation. These eggs were set in the incubator at the same time. Candling was done on 18th day of incubation to detect number of dead germ and clear/infertile eggs and hatchability was recorded in percentage. The data, thus, collected were analyzed to find out the effects of various treatments.

RESULTS AND DISCUSSION

The average per cent hatchability of eggs packed in nitrogen flushed poloyethylene bags was 77.77, 75.00, 34.78 and 15.38 per cent for 1, 2, 3 and 4 weeks pre-incubation periods, respectively (Table 1). The overall hatchability percentage for the total duration of four weeks over fertile eggs was found to be 52.70 per cent. Similarly the per cent hatchability of eggs stored in polyethlene bags with an atmosphere of air for 1, 2, 3, and 4 weeks of storage periods was 63.63, 60.86, and 18.18 and 0.00 per cent, respectively. The hatchability of eggs for all the storage periods combined was 45.07 per cent. In case of unpacked eggs, the percentage of hatchability over fertile eggs was calculated to be 60.00, 52.17, 12.50 and 0.00 after pre-incubation storage periods of 1, 2, 3 and 4 weeks, respectively. When all the storage periods were combined, the hatchability over fertile eggs in the unpacked eggs was 36.00 per cent. It was revealed that the percentage hatchability of eggs stored in nitrogen flushed polyethylene bags for all the storage periods was better than the eggs stored in air filled polyethylene bags and the unpacked eggs. The percentage of dead germs was found to be the lowest for all the storage periods in eggs enclosed in nitrogen flushed polyethylene bags. The beneficial effects of nitrogen atmosphere may be attributed to safeguarding the eggs against the formation of dead germs. Highly significant ($P < 0.01$) differences were observed between storage periods (Table 2). As the storage period was prolonged a

drop in hatchability percentage took place. The results of the study are in agreement with the findings of Becker (1964), Proudfoot (1964) and Gowe (1965) who observed improvement in hatchability by placing eggs in closed environment and storing them in nitrogen atmosphere in polyethylene bags.

TABLE 1. *Hatchability percentage over Fertile Eggs stored under Different Treatments.*

Treatment	Storage period in weeks	No. of eggs stored	No. of clear/infertile eggs.	No. of dead germs.	No. of dead in shell	No. of fertile eggs.	No. of chicks hatched	Hatchability percentage.
Eggs stored in nitrogen flushed polyethylene bags.	1	24	6	—	4	18	14	77.77
	2	24	4	2	3	20	15	75.00
	3	24	1	6	9	23	8	34.78
	4	24	11	11	—	13	2	15.38
Total		96	22	19	16	74	39	52.70
Eggs stored in air filled polyethylene bags	1	24	2	2	6	22	14	63.63
	2	24	1	6	3	23	14	60.86
	3	24	2	14	4	22	4	18.18
	4	24	20	4	—	4	0	0.00
Total		96	25	26	13	71	32	45.07
Eggs stored unpacked (control)	1	24	4	7	1	20	12	60.00
	2	24	1	5	6	23	12	52.17
	3	24	—	15	6	24	3	12.50
	4	24	16	8	—	8	0	0.00
Total		96	21	35	13	75	27	36.00

TABLE 2. *Analysis of variance of Hatchability of Eggs stored under Different Treatments.*

Variation due to	D.F.	S.S.	M.S.	F.R.	Remarks
Treatment	2	1273.45	636.72	3.05	N.S.
Srorage	3	16709.70	5569.90	26.69	**
Treatment x Storage	6	150.20	25.03	0.11	N.S.
Error	24	5008.52	208.68		

LITERATURE CITED

Becker, W.A. 1964. Storage of White Leghorn hatching eggs in plastic bags. Poultry Sci. 43:109-43.

Card, L.H. 1961. Poultry production, Lea and Febriger Philadalphia. 132.

Gowe, R.S. 1965. On the hatchability of chicken eggs stored in plastic bags flushed with nitrogen gas. Poultry Sci. 44:492-495.

Jull, M.A. 1938. Poultry Husbandry. McGraw Hill Book Company, New York and London.

Proudfoot, F.G. 1964. The effect of plastic packing on hatchability of eggs. Jour. Ani. Sci 44: 87-95.