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Influence of Source of Cholesterol, Grade of Cottonseed Oil, and Breed on Experimental Avian Atherosclerosis. (20900)

DAVID F. OPDYKE AND WALTHER H. OTT.

From the Merck Institute for Therapeutic Research, Rahway, N. J.

The chicken is particularly susceptible to coronary and aortic atherosclerosis when placed on a high cholesterol diet(1). White Leghorn cockerels are usually used for this purpose and it is reported that nearly 100% incidence of aortic atherosclerosis may be expected when 7- or 8-week-old cockerels are maintained on a diet supplemented with 2% cholesterol and 5% cottonseed oil for a period of 8 weeks(2,3). Achievement of the highest possible incidence of atherosclerosis in the experimental animals represents a great advantage for the investigator. Failure to obtain a consistently high percentage of atherosclerotic animals on an atherogenic diet leads to equivocal interpretations of the experimental results. Therefore, it appears worth-

while to report our incidence data utilizing 3 different strains of chickens, 2 sources of cholesterol and 2 grades of cottonseed oil.

Methods. All strains of cockerels were obtained from the hatchery at one or 2 days of age and reared for 8 weeks in battery brooders on a standard starter mash. The strains were Kerr White Leghorns, Kerr New Hampshires and Hy-Line White Leghorns. U.S.P. cholesterol from 2 suppliers (Merck, Armour) and 2 grades of cotton seed oil (refined, destearinated) were employed in this study. The chickens were kept on the starter mash plus a supplement of 2% cholesterol and 5% cottonseed oil from the 8th through the 16th week of age and sacrificed. The incidence and severity of the aortic atherosclerosis were

TABLE I. Incidence and Severity of Aortic Atherosclerosis in Cockerel Chickens Fed a Diet Supplemented with 2% Cholesterol (Merck) and 5% Refined Cottonseed Oil from 8th through 16th Week of Age.

Strain and breed	No. of chickens	% incidence of aortic atherosclerosis	(Avg severity index*)	
			Including negatives	Excluding negatives
Kerr White Leghorns†	24	67	1.08	1.68
Kerr New Hampshires†	36	17	.35	2.10
Hy-Line White Leghorns‡	20	65	1.07	1.65

* Avg severity of aortic atherosclerosis (graded on a 0-4 basis).

† Kerr Chickeries, Inc., Frenchtown, N. J.

‡ Corn Belt Hatcheries, Joliet, Ill.

TABLE II. Incidence and Severity of Aortic Atherosclerosis in Hy-Line White Leghorn Cockerels Fed Diets Supplemented with Different Sources of Cholesterol and Cottonseed Oil from the 8th through the 16th Week of Age.

Group	Supplement to starter mash Cholesterol, %	Cottonseed oil, %	No. of chickens	% incidence of aortic ath- erosclerosis	Avg severity index Including negatives	Excluding negatives
I	0	0	24	0	0	0
II	2 Merck	5 Refined	20	65	1.07	1.65
III	2 "	5 Destearinated	16	81	1.56	1.92
IV	2 Armour	5 Refined	19	79	1.03	1.30
V	2 "	5 Destearinated	19	95	1.52	1.61

graded by the criteria suggested by Horlick and Katz(4).

Results. Table I presents the incidence and severity data obtained in each of 3 strains of chickens fed the standard starter mash supplemented with 2% cholesterol (Merck) and 5% refined cottonseed oil. The incidence of atherosclerosis was approximately the same in the Hy-Line and Kerr White Leghorns (65 and 67%), but significantly less ($X^2 = 16$, $P < 0.01$) in the Kerr New Hampshires (17%). The incidence in the White Leghorns, however, did not confirm the 100% incidence reported elsewhere(3) in the Hy-Line strain (pooled $X^2 = 5.1$, $P = 0.03$).

One possible reason for the lower incidence in our experiments than in those reported by Pick *et al.*(3) might have been the differences in the source or grade of cholesterol and cottonseed oil used. To test this possibility 5 groups of Hy-Line White Leghorn cockerels were placed on the diets listed in Table II.

The lowest incidence (65%) occurred in the group on our original atherogenic diet (Merck cholesterol and refined cottonseed oil)

while the highest incidence (95%) was obtained in the group on Armour cholesterol and destearinated cottonseed oil. There is a high probability that this difference was not due to chance ($X^2 = 3.6$, $P = 0.06$). The strain of chicken and the diet supplement employed in Group V are the same as used by Katz and coworkers and our incidence data, therefore, confirm the results published by them.

Conclusions. 1. White Leghorns and New Hampshire chickens apparently differ in their susceptibility to aortic atherosclerosis when placed on the same atherogenic diet. 2. The atherogenic potential of a high cholesterol diet appears to be influenced by the source of cholesterol and the grade of cottonseed oil used.

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