SELECTION FOR EGG PRODUCTION BASED ON BROTHERS CHARACTERS

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THESIS

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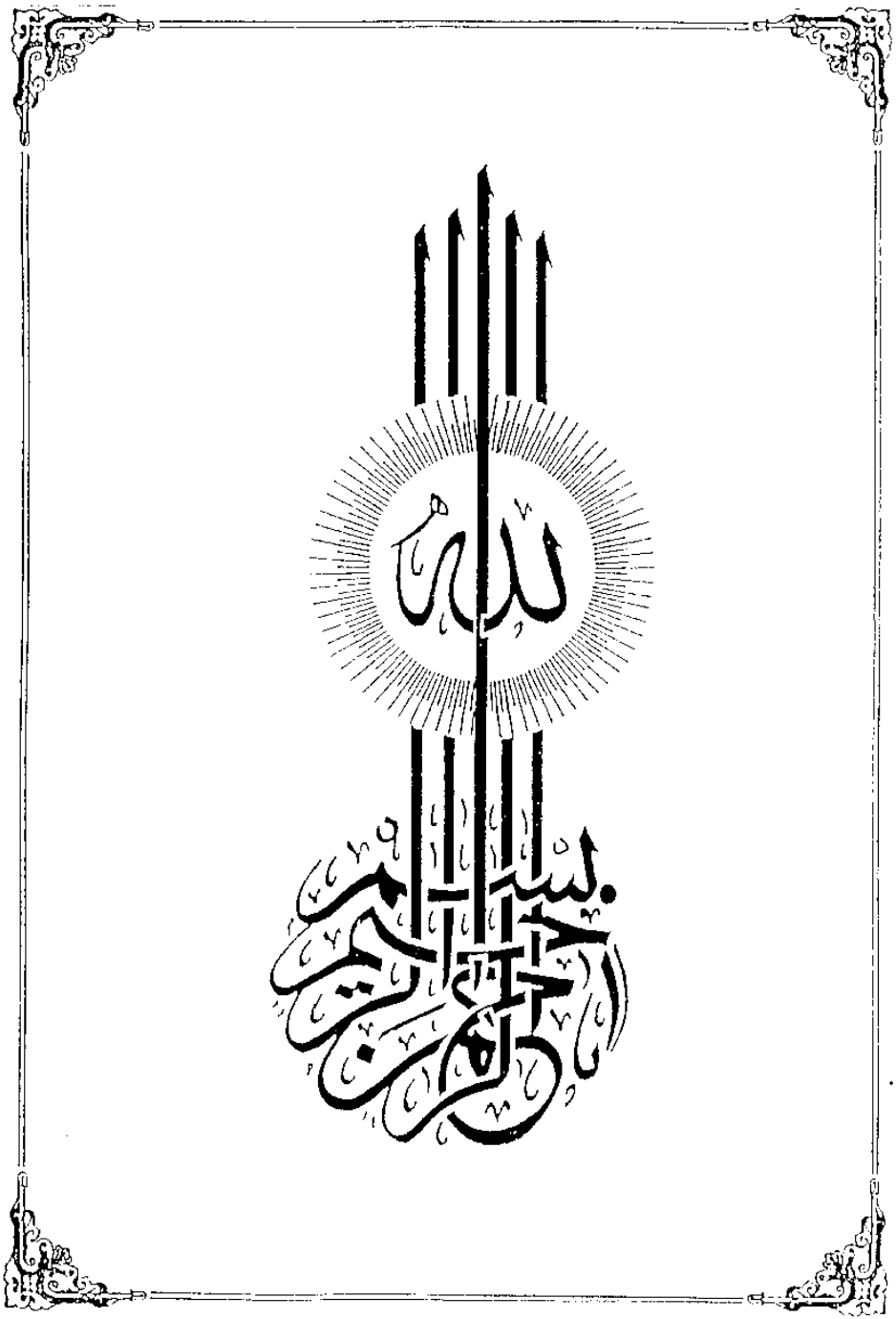

C O N T E N T S

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INTRODUCTION

The effectiveness of selection for various traits in poultry have been proved in respect to body weight. Recently, with the advanced broiler industry, few trails, were investigated to decrease the sexual dimorphism in order to improve the marketing quality of meat type of chickens.

Phenotypic sexual dimorphism is a commonly occuring phenomenon among all domestic avian species. In the fowl, the male is heavier than the hen as shown by many investigators. Little is known about the quantitative genetic relationships of sexual dimorphism to body weight of chickens. The trait of importance in sexual dimorphism is the difference in weight between the two sexes.

Another traits were used such as the secondary sexual characters as critirion of selection for body weight and egg production. The internal physiological environments of males and females differ considerably (e.g. the type and quantity of hormone present). The external environment of males and females also may differ due to such factors as physical activity and social characteristic

attributed to the male. Hence the complement of autosomal genes controlling a quantitative trait may be expressed differently depending on whether the gene effects are expressed in the male or female.

It is of considerable value to select on male characteristics besides on direct selection on females to allow more rapid progress in poultry. Therefore, the length of wattles at early growth period as well as sexual dimorphism for body weight in the main strains and their reciprocal crosses were studied to estimate the correlation between these characters and the economic traits (i.e. early body weight, age at sexual maturity, egg number and egg weight). These estimates would be helpful in establishing a selection program to improve some characters.

REVIEW OF LITERATURE

I. Heritability of early growth period

Lush (1940) defined heritability as that fraction of the observed variation which is caused by differences in heridity. He further distinguished between heritability in the broad and narrow sense. Methods of estimating heritability and the possible biases associated wit h each were described by Lush (1948).

Tables 1, 2 and 3 summarizes heritability estimates of body weight at 4, 8 and 12 weeks of age respectively. It shows a wide variation in some of the estimates reported. However, the averages of estimates indicates small variation in the heritability of body weight, as far as age, sex and breed are concerned. The higher average estimates from the maternal half sibs correlation as opposed to paternal half sibs correlation for body weight indicates the maternal effects.

Table 1

Reported heritability estimates of body weight at 4 weeks

Breed	Sex	Heritability estimates			Degrees of freedom		References
		S	D	S+D	Sires	Dams	
WL	Male	.29±.63	-	-	40	600	Kinney (1969)
WL	"	.21±.44	-	-	40	600	"
WR	"	-	-	.47	64	380	"
WR	"	-	-	.43	32	192	"
NH	"	.75	.74	-	56	218	"
NH	"	.58	.45	-	25	125	"
NH	"	.54	.32	-	25	125	"
D x NH	"	.19	.72	-	45	400	"
D x NH	"	.20	.81	-	45	400	"
Mix	"	.66	-	-	-	-	"
F	"	.44	1.16	.80	-	-	Abdel-Gawad(1971)
F	"	.12	.44	.28	-	-	Ezzeldin (1970)
Average		.40	.76	.50			
WR	Female	-	-	.47	64	380	Kinney (1969
WR	"	-	-	.53	32	192	"
NH	"	.53	.96	-	56	218	"
NH	"	.35	1.01	-	25	125	"
NH	"	.19	.98	-	25	125	"
D x NH	"	.3-	.81	-	45	400	"
D x NH	"	.20	.99	-	45	400	"
Mix	"	.25	-	-	-	-	"
F	"	-.06	.82	.38			Abdel-Gawad(1971)
F	"	.01	.51	.28			Ezzeldin (1970)
Average		.31	.87	.41			
F	combined	-.01	1.70	.85			Abdel-Gawad(1971)
F	"	.46	.69	.54			Amin (1964)
F	"	.42	.37	.39			El-Hossari(1970a)
F	"	.06	.50	.28			
Average		.24	.82	.52			

WL = White Leghorn WR = White Rock NH = New Hampshire
D = Durben Mix = Several strains or breeds F = Fayoumi
S = Estimates of heritability by paternal half sibs correlation
D = Estimates of heritability by maternal half sibs correlation
S + D = Estimates of heritability by full sibs correlation.

Table 2

Reported heritability estimates of body weight at 8 weeks

Breed	Sex	Heritability estimates			Degrees of freedom		References
		S	D	S+D	Sires	Dams	
WR	Male	-	-	.75	-	-	Kinney (1969)
WR	"	-	-	.63	-	-	"
WR	"	-	-	-	32	192	"
WR	"	.64	.34	.49	36	161	"
WR	"	.29	.60	.44	64	380	"
WR	"	-	-	.26	64	380	"
WR	"	-	-	-	32	192	"
NH	"	.25	.13	-	25	125	"
NH	"	.01	.54	-	25	125	"
NH	"	.07	-	.32	8	66	"
NH	"	.26	.34	-	106	-	"
NH	"	.28	.15	-	106	-	"
NH	"	.55	.86	-	56	218	"
Syn	"	.11±.01	1.07±.25	.63±.10	109	756	"
Syn	"	.48	.52	-	-	-	"
Syn	"	.36	.25	-	-	-	"
Syn	"	.24±.07	-	-	115	450	"
Syn	"	.36±.05	-	-	120	405	"
Syn	"	.39	.52	.45	44	428	"
D x NH	"	.20	.62	-	45	400	"
D x NH	"	.35	.57	-	45	400	"
Mix	"	.69	-	-	-	-	"
Mix	"	.47	.85	-	160	160	"
Mix	"	.32	.16	-	160	160	"
Mix	"	.88	-	-	80	164	"
F	"	.31	.58	.44	-	-	Abdel-Gawad(1971)
F	"	.06	1.17	.61	-	-	Ezzeldin (1970)
Average		.36	.43	.50			

Table 2 (Contd.)

WL	Female	.52±.06	-	-	188	728	Kinney (1969).
WL	"	.26±.31	.069±.39	-	100	500	"
WL	"	.48±.09	-	-	684	2364	"
WL	"	.43±.10	-	-	684	2364	"
WL	"	.66±.93	-	-	40	600	"
WL	"	.41±.68	-	-	40	600	"
WL	"	.29	.69	-	300	1500	"
WL	"	.22	.35	-	60	260	"
WL	"	-	-	.10	-	-	"
WR	"	-	-	.82	-	-	"
WR	"	.12	.58	.35	64	380	"
WR	"	-	-	.63	-	-	"
WR	"	-	-	.14	64	380	"
WR	"	-	-	-	32	192	"
WW	"	.25±.09	.77±.10	.51±.12	46	232	"
NH	"	.21	.36	-	8	66	"
NH	"	.06	.95	-	25	125	"
NH	"	.16	.03	-	25	125	"
NH	"	-	-	.33	9	48	"
NH	"	.35	.83	-	128	-	"
NH	"	.15	.83	-	128	-	"
NH	"	.88	.69	-	56	218	"
RIR	"	.34±.55	.28±.66	-	100	500	"
RIR	"	.50±.09	-	-	273	1825	"
Syn	"	.15±.04	.69±.13	.39±.05	109	769	"
Syn	"	-	-	.49	75	500	"
F	"	.26	.28	.27	-	-	Abdel-Gawad (1971)
F	"	.05	1.23	.64	-	-	Ezzeldin (1970)
Average		.34	.50	.43			
F	Combined	.57	1.30	.86			Abdel-Gawad(1961)
F	"	.25	1.19	.72			" (1971)
F	"	.67	.84	.76			Amer (1964)
F	"	.44	.32	.39			El-Hossari (1970a)
F	"	.07	1.06	.57			Ezzeldin (1970)
Average		.40	.94	.70			

Syn = Synthetic line WW = White Wyandotte RIR = Rhode Island Red

Table 3

Reported heritability estimates of body weight at 12 weeks

Breed	Sex	Heritability Estimate			Degrees of freedom		References
		S	D	S+D	Sires	Dams	
F	Male	.52	.54	.53			Abdel-Gawad, (1971)
F	Male	.09	.46	.27			" " (1961)
	Average	.30	.50	.40			
WL	Female	.43±.10	.57±.08	.55			Kinney (1969)
WL	"	.73±.13	.58±.09	.66			" "
F	"	.10	1.61	.85			Abdel-Gawad (1971)
F	"	-.04	.65	.31			Ezz-El-Din (1970)
	Average	.38	.85	.58			
NH	Combined	.38	-	-			Kinney (1969)
NH	"	.42	.60	.51			" "
RIR	"	-	-	-			" "
F	"	.15	1.78	.97			Abdel-Gawad (1971)
F	"	.47	.38	.43			El-Hossari (1970a)
F	"	.05	.47	.26			Ezz-El-Din (1970)
F	"	.15	1.78	.97			Abdel-Gawad (1961)
	Average	.27	1.00	.58			

However, the general interpretation found in the literatures concerning the sex linked and the maternal effect could be summarized as follows :

It is assumed that the sire and the dam will contribute equally to the variance of traits in their offspring unless maternal effect or sex linked genes are involved. Thus any deviation from the equal contribution is called maternal effect in the case of the dam and sex linked gene effect in the case of the sire.

Sex linked is indirectly indicated when heritability from paternal half sibs is larger than the estimate from maternal half sibs. Evidence of sex linked inheritance was reported by Warren (1930) on a cross between Rhode Island Red and Leghorn chicks, Kaufman (1948) and Peeler et al. (1955).

Goodfrey and Williams (1952) demonstrated that Bantam and Plymouth Rock differed by one sex linked gene which has its major effect on growth rate prior to nine weeks of age.

Brunson et al. (1956) stated that heterotic effect on

10 week weight was present, when the reciprocal crosses were made between New Hampshire and Silver Oklabors. The sex linked gene effect on body weight ranged from .01 to 0.4 with a mean of 0.2.

Thomas et al. (1958) produced evidence indicating the importance of sex linked in the expression of body weight at 10 week. Heritability based on sire component were higher than those obtained from dam or combined sire and dam component.

Bell Harry (1960) analysed variance component of the weight of three breeding flocks of poultry at 6 weeks. Two sets of heritability estimates were calculated for each sex in each group, in both species. The estimated variance component strongly suggested that sex linked was operating in body weight inheritance.

Goodman and Goodfrey (1956), Thomas et al. (1958) and Moyer (1962) obtained separate estimates for heritability for males and females, these estimates were higher for females than males in every case.

Amer (1964), studied the heritability of body weight in Fayoumi and found that estimates of heritability for body weight due to the dam's component contribution were higher than that due to the sire's contribution, all over the period of study. The estimates of heritability became higher as chicks advanced in age being .36, .54 and .76 on the basis of both parent's contribution at hatching, 4 and 8 weeks of age respectively. This can be due to the great influence of environment when the chicks were younger.

Krishna and Chaudary (1973) weighed 870 White Leghorn in 2 flocks randombred and selected biweekly from hatching to 24 weeks. They found that dam component estimates of heritability were generally greater than sire component estimates. Maternal effect on body weight were found until 12 weeks of age in the randomized flock and throughout the study period in the selected flock.

Non additive genes effects are caused by gene interaction, dominance and epistasis. The amount of variance contribution by epistasis is usually rather smaller and could be neglected (Falconer, 1960).