

## Short Communication

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### Assessment of Hatching Traits of Four Different Commercial Broiler Breeder Strains: A Comparison and its Trends

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**Abstract.-** A study was conducted to compare four commercial broiler breeder strains *i.e.* Arbor Acer (AA), Hubbard (HB), Hybro (HY) and Starbro (ST). Egg characteristics, hatchability, infertility and chick weights were evaluated. One hundred and sixty eggs/strain were used for measurement of egg characteristics and 600 eggs/strain were incubated to compare the hatching traits. AA had significantly lowest and HB had the highest egg weight and hatchability compared to all strains. After adjusting egg weight, HB had significantly highest yolk weight, yolk diameter, yolk height, albumen height and ST had significantly highest albumen weight and height. Lowest chick weight was in AA and HY. These results indicated significant strain variations. Negative linear regression was observed only for albumen weight, yolk and albumen height. Hatchability, infertility, dead in germ, dead in shell percentages showed significant differences among these broiler strains. On the basis of this study it may be concluded that HB has better hatchability results as compared to AA, HY and ST strains.

**Keywords:** Broiler breeder strains, egg characteristics, hatching traits.

**P**oultry farming is becoming popular in Pakistan due to quick return, poverty alleviation and income generation. Profitable poultry farming mostly depends upon quality of chicks. To fulfill the expanding demands, production of quality chicks should be encouraged at a reasonable price in commercial hatcheries. There are many commercial

poultry companies that rear parent stocks consisting of different broiler parent strains of Hubbard, Hybro, Starbro, Arbor Acres.

External and Internal quality traits of the eggs are significant in the poultry breeding for their influence on the yield features of the future generations, breeding performances, and quality and growth of the chicks. Fertility and hatchability are the most important determinant for producing more chicks from given number of breeding stock within a stipulated period. Fertility and hatchability performance of eggs depend on a number of factors like genetic, physiological, social and environmental (Islam *et al.*, 2002). The fertility and hatchability, interrelated heritable traits, have variation among breeds, varieties and individuals within breed and varieties (Islam *et al.*, 2002) observed variation of hatchability of eggs among White Leg horn, RIR and New Hampshire. But, environment and management often influence the effect of breed on egg fertility and hatchability. Research to compare the hatching traits of broiler breeder strains available in Pakistan is scarce. A study was designed to compare the egg quality characteristics and hatching traits of four broiler strains (Hubbard vs Hybro vs Starbro vs Arbor Acre) available in Pakistan.

#### *Materials and methods*

A total of 760 eggs comprising 190 each of the 4 broiler breeder strains *i.e.*, Hubbard (HB), Hybro (HY), Starbro (ST) and Arbor acres (AA) were purchased from a local breeder companies. Six hundred eggs composed three replicates each having 150 eggs/replicate were incubated to compare the hatching traits *i.e.* weight of settable egg, dead in shell percentage, hatchability percentage, infertility percentage, dead germ percentage and chick weight. The additional 160 eggs/strain were used for measurement of egg characteristics such as egg weight, shell thickness, albumin height, albumin weight, yolk height, yolk diameter, yolk index, yolk weight, yolk colour, blood and meat spots. Electronic scale (0.01g sensitive), digimatic caliper, micrometer, digital screw gauge and yolk Roche colour fan were used to determine egg quality characteristics. The data obtained was subjected to Analysis of Variance using Minitab release 15.

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## Results and discussion

### Egg quality characteristics

The results showed that the highest ( $P < 0.05$ ) egg weights were of HB strain and the lowest ( $P < 0.05$ ) were of AA strain (Table I). This increase in egg weight reflects the highest breeder flock age of HB strain as eggs obtained from breeder flock of HB, ST, AA and HY were 52, 50, 50 and 50 weeks old respectively. These results are in agreement with Pedroso *et al.* (2005), who reported that age of breeder flock effect egg weight and that the initial eggs produced by broiler breeder hens are relatively small compared with older breeder age eggs.

The shell weight of HY strain was higher compared to minimum weight of AA (Table I). The result of present study are in agreement with Selim and Seker (2004) and Khurshid *et al.* (2003) who reported that egg weight has positive ( $P < 0.05$ ) correlation with the egg shell weight. In the present study, shell thickness of all strains was similar in ranges and had a positive correlation with egg weight (Table I). Similarly Khurshid *et al.* (2003) reported that egg shell thickness has positive correlation with egg weight and egg shell thickness can be predicted from egg weight.

The yolk colour of ST strain was darker ( $P < 0.05$ ) compared to all other three strains (Table I). Jonathan *et al.* (2000) observed that yolk colour were due to carotenoids in poultry diet which are biologically active pigments in poultry feed ingredients. The maximum ( $P < 0.05$ ) yolk diameter was observed for AA strain and HB strain as compared to all others strains (Table I). It can be due to the reason that yolk diameter always increases when there is increase in egg weight and breeder age (Yavuz *et al.*, 1996). The maximum yolk weight was of HB strain as compared to minimum yolk weight of ST strain (Table I). Egg yolk weight can be positively correlated with the egg weight, egg size and nutrition (Khan *et al.*, 2004). However, the mean yolk height showed non-significant difference ( $P > 0.05$ ) among different strains.

The maximum albumen weight was obtained from ST strain and compared to minimum in eggs from AA and from HB strain (Table I). The results of present study are in agreement with other studies who reported significant difference between

different genotype in albumen weight (Khan *et al.*, 2004) and that egg weight is correlated significantly with albumin weight (Aytekin *et al.*, 2003). In the present study the maximum albumen height ( $P < 0.05$ ) was in HB strain and a negative correlation between egg weight and albumen height was observed which indicated that when egg weight increases, albumen height decreases. However, the mean yolk index showed non-significant difference ( $P > 0.05$ ) between different broiler strains (Table I).

An increased ( $P < 0.05$ ) meat spots (3%) were observed in eggs obtained from HB strain compared to lowest (1%) in AA and ST strain. Whereas, the blood spot percentage in eggs were significantly ( $P < 0.05$ ) higher in ST strain (1.98%) and lower were in HB strains (0.66%). It has been reported that meat spots are inherited factor and it increases as the age of breeder flock increases (Jacqueline *et al.*, 2000) and blood spots could be due to sudden change in environmental temperature or nutritional or hereditary differences in breeder flock.

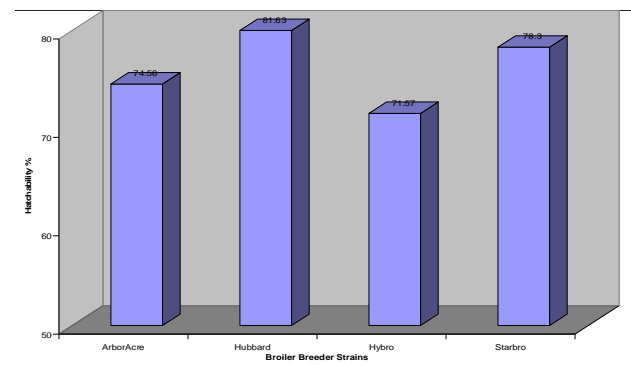


Fig. 1. Hatchability percentage of eggs obtained from four different broiler strain.

### Hatchability traits

The results showed that hatchability percentage of HB and ST were significantly ( $P < 0.05$ ) higher compared to AA and HY strain (Fig. 1). The result of this study are in agreement with Islam *et al.* (2002), who studied comparative assessment of fertility and hatchability of Barred Plymouth Rock, White leghorn, Rhode Island and White Rock hen and observed that hatchability of different strains depend on egg weight of these strains. In the present study the egg weights clearly influenced the chick weights.

**Table I.- Egg characteristics of four different broiler strains.**

Treatment	Egg weight (gm)	Shell Weight (gm)	Shell Thickness (mm)	Yolk color	Yolk diameter (mm)	Yolk weight (gm)	Yolk height (mm)	Yolk index	Albumin weight (gm)	Albumen height (mm)
Arbor Acre	59.4 <sup>c</sup>	6.64 <sup>c</sup>	0.44 <sup>a</sup>	4.50 <sup>c</sup>	46.75 <sup>a</sup>	19.8 <sup>b</sup>	1.78 <sup>a</sup>	0.04 <sup>a</sup>	32.15 <sup>c</sup>	4.59 <sup>b</sup>
Hubbard	68.5 <sup>a</sup>	6.99 <sup>b</sup>	0.45 <sup>a</sup>	4.49 <sup>c</sup>	44.83 <sup>a</sup>	24.2 <sup>a</sup>	1.88 <sup>a</sup>	0.04 <sup>a</sup>	32.23 <sup>c</sup>	5.76 <sup>a</sup>
Hybro	63.71 <sup>b</sup>	7.20 <sup>a</sup>	0.46 <sup>a</sup>	6.21 <sup>b</sup>	43.18 <sup>b</sup>	19.6 <sup>b</sup>	1.78 <sup>a</sup>	0.040 <sup>a</sup>	34.12 <sup>b</sup>	4.05 <sup>b</sup>
Starbro	63.93 <sup>b</sup>	6.93 <sup>b</sup>	0.49 <sup>a</sup>	8.22 <sup>a</sup>	42.07 <sup>b</sup>	18.8 <sup>c</sup>	1.77 <sup>a</sup>	0.040 <sup>a</sup>	35.92 <sup>a</sup>	5.23 <sup>a</sup>
Linear	—	0.068	0.0032	0.035	0.137	0.139	-0.0067	—	0.534	-0.094
Regression										

W, Different superscripts in the column indicates significant differences at P < 0.05.

The infertility percentage of HY (16.0) and AA (14.5) were higher (P < 0.05) compared to HB (8.9) and ST strain (12.5). The results of present study are similar with Islam *et al.* (2002), who reported that infertility percentage have significant difference among breeds and also observed that infertility depend on genotype, management and environment.

The dead in shell percentage of HB (5.6) was higher (P < 0.05) than ST (4.5) but lower (P < 0.05) than AA (6.5) and HY strain (6.0). However, the dead germ percentage of AA (4.0) was higher (P < 0.05) compared to HB (3.3) and ST (1.32) but significantly lower (P < 0.05) than the HY strain (5.1). It is reported that the dead in shell and dead in germ percentages of different breeds have significant difference among breeds and that dead germ is not dependent on breeds rather more influenced by management and environment Islam *et al.* (2002).

### Conclusions

This study suggests that eggs from different broiler strains can differ in characteristics whose importance depends on the ultimate use of the eggs. The highest albumin and yolk weights in ST and HB strain respectively will be an important parameter to the egg breaking industry as the profit will depend

upon the weights. However, albumin and yolk heights can be a direct indicator of the storage period of eggs prior to incubation. On the basis of hatchability traits HB strain proved to more compatible in the warm summer conditions as compared to AA, HY and ST strains in Pakistan.

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