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Performance of Different Fast Growing Broiler Strains in Winter

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Abstract: Three hundred commercial broiler chicks of three different strains (Arbor Acres, ISA Vedette and Hybro) each of 100 were reared from day-old to 6 weeks of age to compare their performance characteristics under Bangladesh condition in winter. Body weight gain and feed consumption up to 6 weeks of age were significantly higher in ISA Vedette than in Arbor Acres and Hybro. There was no significant difference between Arbor Acres and Hybro with respect to these variables. Survivability and feed efficiency among the strains were non-significant, although Arbor Acres showed slightly higher survivability than Hybro and ISA Vedette. Despite a slightly higher livability in Arbor Acres, it may be concluded that ISA Vedette may perform the best in winter than in Hybro and Arbor Acres. The later two strains may also be recommended for commercial boiler production in winter, but priority may be given to ISA Vedette strain.

Key words: Broiler, strain, Arbor acres, ISA vedette, Hybro, performance, survivability, efficiency, profit

Introduction

According to BBS (1995), the consumption of animal protein in Bangladesh is only 9.56g/day/person as against the standard requirement of 36.0g (Ahmed and Islam, 1990). This has resulted malnutrition in rural people and also urban poor rickshaw pullers and day labourers. To develop a nation that is the people to be sound, healthy and ambitious, supply of huge amount of animal protein is needed. This is because animal protein is superior to vegetable protein in some respects like higher percent of protein, higher digestibility, higher biological value (BV), less fiber content and well balanced essential amino acids. (Scott, 1983). Hoffman and Gwin (1954) observed that chicken meat is an excellent source of essential amino acids for human being. Snyder *et al.* (1962) reported that poultry meat and egg contain the right kind of fat which is necessary for good health. The food selected for human consumption should be of high protein and low calorie content and thus chicken meat is highly acceptable in this respect. The people of Bangladesh consume only 1kg meat per head per year. In the same way, the egg consumption in our country and developed country is 20 Vs 280 (WPSA, BB Seminar, 1999). Broiler meat can efficiently and rapidly fulfil the shortage of protein requirement, since it can be produced at least possible time as compared to other meat-producing animals. Poultry contribute approximately 37% of total animal protein supplied in Bangladesh (Ahmed and Islam, 1990). Production characteristics and performance of the broilers depend on their adaptability to the climatic stresses. Baghel and Pradhan (1989) noted great influence of environment and reported that body weight gains and feed intake of the broilers were maximum in cold followed by those of hot-humid and hot season. Lack of adequate information on the comparative performance of fast growing broiler strains is a constraint to the speedy growth of broiler industry in Bangladesh. Bangladesh has a great prospect for raising broilers. Broiler production reveals the fact of minimum expense with maximum return. It can be mentioned here that small area of available land can be well utilized for commercial broiler farming in thickly populated country like Bangladesh. So there is a wide scope for raising various strains of broiler adaptable to the climatic condition of our country. Now in Bangladesh there are about 10 International Poultry Breeding Companies who supply day-old chicks, either from imported parent stocks or from imported hatching eggs (Latif, 1998). Although several experiments have been done on the

performance of different broiler strains, but it is necessary to investigate further the adaptability of fast growing broiler under the climatic condition of our country. Bohren *et al.*, (1982) showed that fast growing broilers were heat stressed at higher environmental temperatures and therefore were not suitable to rear in the tropic. The present research work was, therefore, designed to observe the performance of three different fast growing commercial broiler strains, Arbor Acres, ISA Vedette and Hybro reared in winter at BAU Poultry Farm, Mymensingh.

Materials and Methods

The research work was conducted at Bangladesh Agricultural University (BAU) Poultry Farm, Mymensingh for a period of 6 weeks to find out the productive performance of different fast growing broiler strains in winter (between December, 1998; January, 1999). Three hundred day-old Arbor Acres, ISA Vedette and Hybro fast growing broiler strains were considered for the experiment. 100 of each broiler strain were collected from the different commercial poultry farms of Bangladesh. Three strains were divided into three different treatments with 5 replications for each treatment. The chicks of three strains were randomly distributed in separate pens according to treatments and replications. The number of birds in each replication was 20. The experimental broiler house was properly washed and cleaned by using hot water. After proper drying the house was divided into 15 separate pens of equal size by bamboo materials and wirenet partition. Ceiling, walls and floor were thoroughly cleaned by spraying water using under driven hose-pipe and subsequently disinfected with phenyl solution followed by Iosan. To protect the bird from cold weather polyethylene paper was used into the ventilator and the wirenet walls. Before placement of the chicks the house was fumigated by formalin and potassium permanganate @ 4.73 ml formalin and 227g potassium permanganate for 28.31 m³.

The management procedures followed during the experimental period are stated here, The chicks were brooded up to three weeks. During the early period of brooding, the environmental temperature was lower than the required brooding temperature. Therefore additional heat was provided to chicks by providing 100 watt electric bulbs in the respective pens. But still the temperature was slightly lower than the optimum. Although the open space was covered with polyethylene paper, it was difficult to maintain the brooding temperature in winter, as the research work was held on winter season.

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During experimental period, the temperature of the experimental house and pens was recorded three times in a day (6 AM, 2 PM, and 10 PM). The Relative Humidity was recorded from BAU weather yard adjacent to the Poultry Farm. Initially, it was planned to expose birds to a continuous lighting of 23.5 hours and a dark period of 30 minutes in each 24 hours. This schedule could not be properly maintained due to power break. Power break occurred during the experimental period on 14th and 26th days for 2 hours in the evening. Fresh and dried rice husk at three inches depth was used as litter material during the rearing period. After each week the litter was cracked with a belcha to break its compactness and maintain proper moisture. In each pen, one feeder and one waterer were provided according to their space requirement. For each bird 4 cm feeder space was provided up to 3 weeks of age and 6.5 cm up to marketing age. A waterer with a capacity of 3 litre, was provided in each pen. Feed and water was supplied *ad libitum* to the bird. Feeder was washed after each week and the waterer was washed twice daily. Rations (Broiler starter and Broiler finisher) were formulated with locally available feed ingredients. The market price of the feed ingredients and the minimum nutrient requirements for broiler starter and broiler finisher diets were considered during ration formulation. The composition of the ration supplied to the birds is shown in Table 1. Vitamin-mineral premix was mixed to the diet as per recommendations of the manufacturer. In addition, Rhodivit WS (Rhone-Poulenc) was added to drinking water to overcome the ill effect of stress. Formulated broiler starter diet was fed between day-old and 21st days and broiler finisher diet was fed between 22 and 42 days of age. Feed and water were supplied *ad libitum* to the birds throughout the experimental period. Fresh and clean water was supplied three times a day.

All the birds were vaccinated against Baby Chick Ranikhet Disease by BCRDV following the instruction of vaccine manufacturer. One ampoule of BCRDV vaccine was diluted with 6 ml of distilled water and the birds were vaccinated at 6th day following by a booster dose at 18th day by intraocular method. BCRDV were collected from Animal Vaccine Research Center (AVRC) Mohakhali, Dhaka. The birds were also vaccinated against Gumboro disease by Nobilis Gumboro 228E vaccine (Intervet International B.V. Boxmeer-Holland) following the instructions of the manufacturer. One ampoule of 228E was diluted with 100 ml of supplied solution and the birds were vaccinated at the age of 12th day-old, followed by a booster dose at 22rd day by intraocular method. The vaccination schedule is shown in Table 2. For the treatment of bacterial and protozoan infections, medication was done during the experimental period. The following medicines were used:

- i) Renamycine Tab. 500mg (Renata Ltd.) were used to prevent bacterial Infection in 3rd weeks of age.
- (ii) ESB₃ 30% (Novartis, Bangladesh Ltd) was added @ 1g per litre drinking water at the age of 4th weeks and 5 weeks to prevent coccidiosis.

During 6 weeks rearing period following records were kept.

- a) Body weight: Initial and at the end of each week.
- b) Feed consumption: At the end of each week.
- c) Livability: By counting daily.

Temperature and humidity: Four times daily during experimental period.

The data that were obtained by calculation are body weight gain, feed conversion ratio (FCR), feed consumption, survivability, performance index (PI%) and production number (PN). Based on different production variable, the efficiency of broiler performance was evaluated by calculating production

number. The PN of different treatments were calculated by a formula given by Euribrid (1994)

$$PN = \frac{a.l.w.x \% Liv.}{Days \times f.c} + 10$$

Where, a.l.w. = Average live weight (g)
% Liv. = Liveability
Days = Duration of fattening in days.
f.c. = Feed conversion

Performance index (%) is also a measure to observe the performance of broilers. It was calculated using the following formula (Singh, 1987);

$$\text{Performance Index (PI\%)} = \text{Body weight/Feed consumption} \times 100$$

The experimental data were analyzed statistically using analysis of variance (ANOVA) technique by a computer using statistical package program in accordance with the principle of Completely Randomized Design (CRD). Significant differences among the treatments were identified using Duncan's New Multiple Range Test (DMRT). The dressing yield parameters were converted to the percentage of their respective body weight for statistical analysis

Results and Discussion

The average weekly body weight, feed consumption, feed efficiency, performance index, production number and livability of the different fast growing broiler strains (Arbor Acres, ISA Vedette and Hybro) at 6th week of age are shown in Table 3

Body Weight: The weekly live weight of different fast growing broiler strains are presented in Graph 1. Significant differences ($P < 0.01$) in body weight were observed among the strains during 1st to 6th week of age (Table 4). It is interesting to note that ISA Vedette showed significantly ($P < 0.01$) higher body weight up to 6 weeks of age compared to Hybro and Arbor Acres. This result was similar with the observation of Azad (1996). This was also similar to the findings of Zullitch *et al.* (1989) except for Arbor Acres. He showed the live weight gain of Arbor Acres, Hubbard, Hybro and ISA Vedette strains were 1561, 1620, 1521 and 1522g respectively. Whereas the present study observed the fast growing broiler strains i.e. Arbor Acres, ISA Vedette and Hybro gained body weight 1372, 1552 and 1401g respectively at 6 weeks of age. Significant differences between Arbor Acres and Hybro strains were not observed even in any week of age.

Feed Consumption: The cumulative feed intake at different weeks of age is shown in Table 5. Feed consumption among the strains differed significantly at 1st, 2nd, 5th and 6th weeks of age. ISA Vedette strain consumed more in comparison with Hybro and Arbor Acres. In 3rd and 4th weeks of age the strain highly differed in respect of feed consumption among them. This result was supported by Hornia-Kova (1985). He showed significant differences in growth and feed consumption among strains. He also showed the heavier broiler strain consumed more feed and gain more weight which was reflected both at the starting and finishing stages of growth. Feed consumption is also shown in Fig. 2.

Feed Conversion Ratio (FCR): It was indicated that up to 4th weeks of age the feed conversion efficiency of ISA Vedette was higher than those of other two strains. But in 5th week Hybro showed better feed efficiency than Arbor Acres and ISA Vedette. It was also observed in 6th week that Arbor Acres showed higher feed conversion efficiency than other two

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Table 1: Composition of rations in which different feed ingredients are used with amount

Feed ingredients	Amount (kg) in 100 kg mixed feed	
	Broiler starter diet (Day-old to 21 days)	Broiler finisher diet(22 to 42 days)
Maize	46.00	48.00
Rice polish	20.00	21.50
DCM-Animal protein concentrate	5.00	3.00
Full fat Soybean	8.00	9.50
Soybean meal	7.50	8.00
Bone and Meat meal	8.00	7.00
Salt	2.50	2.50
Vitamin-mineral premix	0.50	0.50
Coccidiostat (DOT)	+	+
Calculated Nutrients (DM basis)		
Metabolizable energy (%)	2907.80	3010.00
Crude protein (%)	22.24	19.32
Calcium (%)	1.20	0.97
Av. Phosphorus (%)	0.40	0.39
Lysine (%)	1.10	0.96
Methionine (%)	0.45	0.40
Crude fibre (%)	6.42	5.15
Fat (%)	8.50	9.00

Table 2: Followed Vaccination Schedule to the experimental broiler strains

Name of vaccine	Age of the bird	Dose of diluted	Rout of administration
BCRDV	6th day	1 drop in each eye	Intra ocular/ Eye drop
Gumboro Vaccine (228E)	12th day	1 drop in each eye	Eye drop
BCRDV (Booster dose)	18th day	1 drop in each eye	Eye drop
228 E Vaccine (Booster dose)	22nd day	1 drop in each eye	Eye drop

Table 3: Performance of different fast growing broiler strains in winter at a glance

Parameters	Age (Wks)	Arbor Acres	ISA Vedette	Hybro	Level of Significant
Average body weight (g/bird)	6th	1372.48b	1552.25a	1552.25a	*
Average feed consumption (g/bird)	6th	2749.00b	3105.00a	2764.00b	*
FCR	6th	2.00	2.06	2.03	NS
Perofmance index (PI%)	6th	66.66c	75.48a	69.25b	*
Production number	6th	158.48b	170.43a	154.52b	*
Survivability (%)	1st-6th	97	95	94	NS

* Significant (P<0.05) NS – Non-significant (P>0.05)

Table 4: Mean body weight (g) of different commercial strains of broiler

Age (weeks)	Commercial broiler strains			Level of Signifi - nce
	Abror Acres	ISA Vedette	Hybro	
Initial	41.50±0.27	41.70±0.27	40.77±0.27	NS
1st	90.70b±1.42	98.60a±1.42	89.30b±1.42	*
2nd	214.40b±4.50	245.00±4.50	222.40ab±4.50	**
3rd	446.48b±7.48	504.01a±7.48	452.40b±7.48	**
4th	720.28b±12.33	798.09±12.33	714.57b±12.33	**
5th	1022.47b±19.45	1167.25a±19.45	1056.60b±19.45	**
6th	1372.48b±22.19	1552.25a±22.19	1401.60b±22.19	**

NS, Non-significant (P>0.05) *, Significant (P>0.05)

Table 5: Average cumulative feed consumption (g) of the experimental birds at different weeks of age

Age (weeks)	Commercial broiler strains			Level of Significa - nce
	Abror Acres	ISA Vedette	Hybro	
1st	154.00b±1.03	161.00a±1.03	154.00b±1.03	*
2nd	392.20b±4.73	430.00a±4.73	400.60b±4.73	*
3rd	799.00c±11.34	897.00a±11.34	849.00b±11.34	**
4th	1349.40c±15.27	1479.60a±15.27	1409.00b±15.27	**
5th	2001.00b±39.08	2298.10a±39.08	2051.00b±39.08	*
6th	2749.00b±50.54	3105.00a±50.54	2764.00b±50.54	*

* Significant (P<0.05) **, Highly significant (P<0.01)

Table 6: Mean performance index (%) of the broiler strains at different weeks of age

Age (weeks)	Commercial broiler strains			Level of Significance
	Abror Acres	ISA Vedette	Hybro	
1st	2.90±0.11	3.48±0.11	2.82±0.11	NS
2nd	9.48±0.38	11.65±0.38	10.12±0.38	NS
3rd	21.99b±0.60	26.01a±0.60	22.00b±0.60	*
4th	36.36b±1.03	40.77a±1.03	34.38b±1.03	*
5th	50.32b±1.15	57.24a±1.15	52.6b±1.15	*
6th	66.66c±1.25	75.48a±1.25	69.25b±1.25	*

NS, Non-significant (P>0.05) *, Significant (P>0.01)

Table 7: Survivability (%) of the broiler strains at different weeks of age

Treatment	Survivability						Leve of Signifi - cant
	1st	2nd	3rd	4th	5th	6th	
Arbor Acres	100	100	99	99	99	97	NS
ISA Vedette	100	98	98	97	97	95	NS
Hybro	100	99	96	96	95	94	NS

NS-Non-significant (P>0.05)

strains. So, it is evident from the Graph 3. that there was no significant difference (P>0.05) at all ages in respect of feed conversion ratio among the strains. The results are in agreement with the findings of Lambio et al. (1987), Sinha and Verma (1984) and Azad (1996).

Performance Index (PI%): The overall performance of the broiler strains were calculated with formulae and tabulated in Table 6. Performance indexes (PI%) were found significantly different from 3rd to 6th weeks of age. During those period ISA Vedette had always higher production index followed by Hybro and Arbor Acres except in 4th week. In 4th week Arbor Acres performed better than Hybro. Differences at 1st and 2nd weeks of age did not differ significantly (P>0.05).

Production Number (PN): The production number obtained from different weeks of age of the fast growing broiler strains are shown in Graph 4. It is distinctly clear that in all ages production number of ISA Vedette was significantly (0.05) higher like other parameters than Arbor Acres and Hybro. But there were no significant difference (P>0.05) in all ages between Arbor Acres and Hybro except in 4th week of age. In 4th week these two strains showed more variation in their production number than other weeks of age.

Livability: In the present study, the livability's during the experimental period were 97, 95 and 94% (Table 7) for

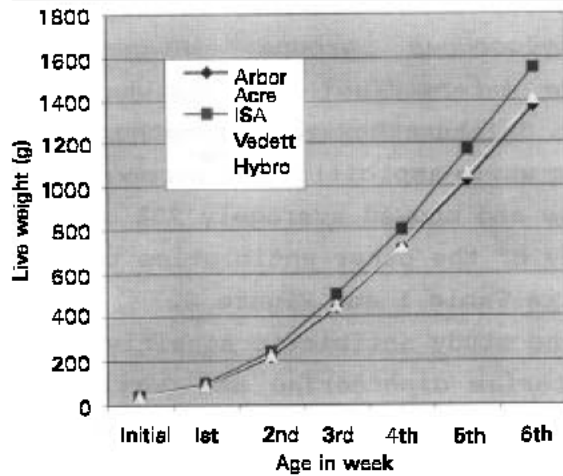


Fig. 1: Weekly average body weight of different strains of broiler

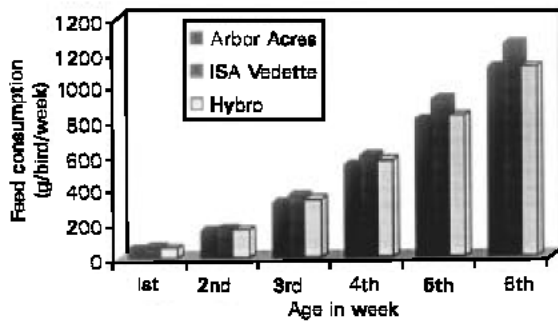


Fig. 2: Weekly average feed consumption of different fast growing broiler strains

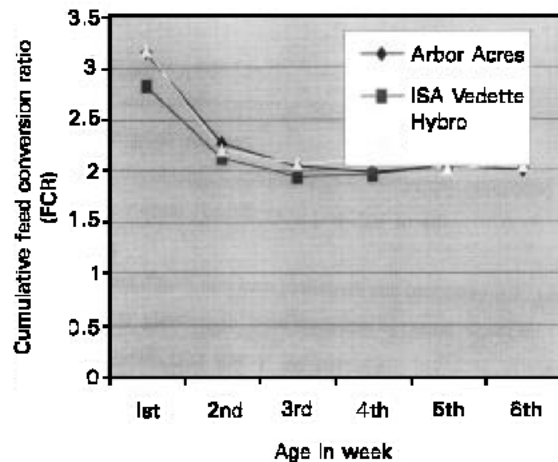


Fig. 3: Weekly FCR of different Broiler Strains

Arbor Acres, ISA Vedette and Hybro. It was observed by Chi-square analysis for livability and by the help analysis of

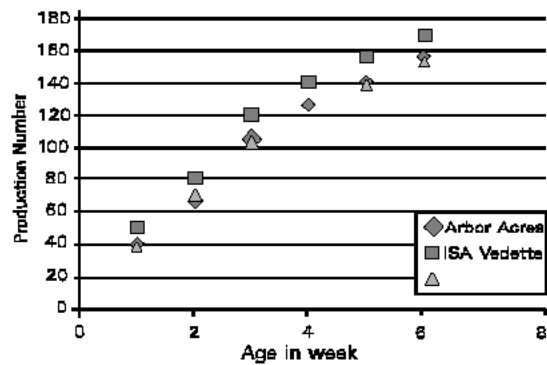


Fig. 4: Average production number of broiler strains at different weeks of age

variance the three strains showed non-significant difference. This result is agreed with the finding of Islam (1993). Akhter reported (1996) that mortality was higher in fast growing broiler than in moderate growing broiler and concluded that fast growing broiler should not be reared in hot humid environment but slow growing suit better in hot humid environment. Considering all the fact and findings of the experiment it may be concluded that ISA Vedette fast growing broiler strain is the most suitable for rearing in winter season in comparison with other two fast fast growing broiler strains (Hybro and Arbor Acres).

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