The Journal of Animal & Plant Sciences, 24(3): 2014, Page: 714-721
ISSN: 1018-7081

GROWTH PERFORMANCE AND ECONOMIC APPRAISAL OF PHASE FEEDING AT DIFFERENT STOCKING DENSITIES IN SEXED BROILERS

S. Mehmood, A.W. Sahota, M. Akram, K. Javed*, J. Hussain, M.S. Shaheen, Y. Abbas, A. S. Jatoi** and A. Iqbal*

Department of Poultry Production, *Department of Livestock Production, University of Veterinary and Animal Sciences, Lahore, **Department of Poultry Husbandry, Shaheed Banazir Bhutto University of Veterinary and Animal Sciences, Sarkand
Corresponding Author E-mail: shahid.mehmood@uvas.edu.pk

ABSTRACT

The present study was undertaken to examine the growth performance and economic efficiency involving 1440 sexed broilers (720 of each sex), maintained in environmentally controlled broiler house under litter floor subjected to four different levels of phase-feeding at three different stocking densities (0.7, 0.6, 0.5 sq.ft). The birds in group- A were offered diet with 19% crude protein (CP) throughout the grow-out period of 42 days. Those in group-B were allotted broiler starter diet with 20% CP up to 28 days of age and then broiler finisher diet with 17% CP up to 42 days of age. The diet for birds in group-C was split into 03 phases i.e. 0-10, 11-26, 27-42 days furnishing with 21, 19 and 18 % CP, respectively. The birds in group D were maintained on 4 phase feeding regimes i.e. 0-10, 11-20, 21-34, 35-42 days, with CP levels of 21, 20, 18 and 17%, respectively. Weekly data on growth performance parameters were recorded and were analyzed using Completely Randomized Nested Design. The comparison of means was made using DMR test. The results revealed that birds maintained at 0.7 sq. ft. stocking density exhibited significantly ($P<0.05$) better body weight, FCR, uniformity, point spread and point index, while, significantly highest feed intake, body weight and improved FCR was recorded in 4-phase feeding program as compared to single, two and three phase feeding pattern but sex did not significantly influence these parameters. Higher profit was achieved in four phase feeding program at 0.7 sq. ft. stocking density.

Key words: broiler, sex, phase feeding, stocking density, growth performance, economics.

INTRODUCTION

Poultry industry has shown tremendous development in the recent years as it is one of the best systems of production of animal protein foods. Poultry production possesses excellent prospects such as quick growth rate, rapid turnover of capital, better feed conversion ratio and highly demanded products such as eggs and meat. Poultry meat contributes about 26.80 percent to the total meat production in Pakistan (Anonymous, 2013). For sustained growth and efficient meat production in the country, better feeding and management strategies need to be employed. Among these, phase feeding and provision of proper stocking density can help in managing the nutrient and space requirement of broilers needed to maximize their productivity. Phase feeding is performed to take advantage from the changes in nutrient requirements of broilers at various stages of growth. Phase-feeding (PF) has been described by Emmert and Baker (1997) as a system designed to meet the needs of diversified poultry production systems and is based on Illinois Ideal Chick Protein (IICP) (Baker and Han, 1994; Baker, 1997) and NRC recommendations (1994). Whereas, the NRC (1994) recommends a single set of feeding both for male and female broilers, with dietary amino acid requirements segregated into three fixed periods including the starter (0 to 3 weeks), grower (3 to 6 weeks), and finisher phases (6 to 8 weeks). Phase feeding is a good means of reducing feed costs during the grower and finisher phases (Pope and Emmert, 2001) without influencing performance and having environmental benefits (Gutierrez *et al*., 2008). The findings of studies (Sahota *et al*., 2012 and Mehmood *et al*., 2012) indicated that phase-feeding is directly correlated with feed intake, body weight and feed conversion ratio.

Economic use of floor space is a strategy used for increasing the amount of meat produced per unit area. However, its effects on bird's health and productivity need to be considered as well. Each chick should be provided 0.8 to 1.0 sq. ft of floor space for maximum weight gain and there is a progressive decrease in body weight and body weight gain for both sexes as floor space per broiler decreased (Skrbic *et al*., 2008). The early research reported that crowding of birds did not reduce the average body weight and maximum stocking density of 0.5 sq. ft can be reached at 7 weeks of age without any adverse effect on bird's performance (Dozier *et al*., 2005). On the contrary, Dawkins *et al*. (2004) observed that floor space had little effect on body weight. It has also been reported that crowding reduced the average feed consumption and feed efficiency was decreased as population densities increased, while, Skrbic *et al*. (2008) reported that lesser stocking density resulted in better growth and yield of processed carcass.

Table 1.Experimental Plan

Groups	Phases	CP Levels (%)	Days	ME (Kcal/ kg)	Stocking density (sq. ft)
A	01	19	42	2800	0.7 0.6 0.5
B	01	20	28	2800	0.7 0.6 0.5
	02	17	14	2800	0.7 0.6 0.5
C	01	21	10	2800	0.7 0.6 0.5
	02	19	15	2800	0.7 0.6 0.5
	03	18	17	2800	0.7 0.6 0.5
D	01	21	10	2800	0.7 0.6 0.5
	02	20	10	2800	0.7 0.6 0.5
	03	18	14	2800	0.7 0.6 0.5
	04	17	08	2800	0.7 0.6 0.5

Phases = 04 Stocking densities = 03 Sexes=02 Replicates= 03
Birds per replicate = 20 Total birds=4×3×2×3×20 = 1440

Keeping in view, the preceding inconsistent view point and conflicting reports on the subject the present study was undertaken to investigate the effects of phase feeding and stocking density on growth performance and economic efficiency in sexed broilers.

MATERIALS AND METHODS

The present study of 6 weeks duration was conducted at Poultry Research and Training Centre (PRTC), Department of Poultry Production, Ravi Campus, University of Veterinary and Animal Sciences (UVAS), Lahore.

Experimental Plan: One thousand four hundred and forty (1440) commercial (Hubbard) day-old (sexed) broiler chicks were used in this experiment. They were provided four different levels of phase feeding (A, B, C and D) by maintaining them at three different stocking densities (E, F and G). The chicks were subjected to adaptation period of one week and then were randomly divided into 72 experimental units of 20 chicks each by replicating each for three times (The detail is given in Table 1). The broilers in group A were offered diet with 19 percent crude protein (CP) throughout the grow-out period of 42 days. Those in group B were allotted broiler starter diet with 20 percent CP up to 28th days and then broiler finisher diet with 17 percent CP up to 42 days of age. The diets for group C were split into three different phases; 1st phase was up to 10thdays, followed by 2nd and 3rd phases up to 26th and 42nd days of age, with crude protein (CP) levels of 21, 19 and 18 percent, respectively. In group D, feeding regime was divided into four phases. 1st phase up to 10th days followed by 2nd, 3rd and 4th phases up to 20th, 34th and 42nd days of age, with CP levels of 21, 20, 18 and 17 percents, respectively. At the end of experiment all the birds received ration containing weighed average of 19 percent C.P and 2800 Kcal Metabolizable energy. (The ingredients and nutrient composition of the experimental diets have been presented in Tables 2 and 3, respectively. All the feeding regimens were tested at 3 levels of stocking density (0.7, 0.6 and 0.5 sq ft^2) in environmentally controlled poultry house on littered floor. Economics of phase feeding and stocking density was worked out at the termination of the trial. Optimum conditions of temperature, humidity and ventilation as per recommendations of Hubbard management guide (Hubbard, 2012) were maintained for all the treatment groups. Feed, water and light were offered to the birds for 24 hours throughout the experimental period.

Table 1: Ingredients composition of experimental diets

Ingredients (%)	CP (%)				
	21	20	19	18	17
Maize	35.13	54.85	46.53	58.70	57.97
Rice polish	0.00	5.00	7.00	6.00	10.00
Wheat Bran	1.00	3.00	3.50	4.00	3.40
Canola Meal	15.00	6.05	11.00	1.67	0.00
Rapeseed Meal	4.00	4.00	3.00	4.00	4.00
Soybean Meal	15.65	16.00	17.00	17.50	17.07

Corn Gluten Meal	1.20	1.60	1.27	1.60	0.57
Poultry Byproduct meal	0.00	2.00	1.00	1.00	1.00
Fish Meal	2.00	2.50	3.00	0.00	0.00
Marble Chips	0.80	0.55	0.30	0.73	0.73
DCP	0.80	0.53	0.80	1.12	1.13
Lysine sulphate	0.57	0.48	0.50	0.53	0.52
DL Methionine	0.09	0.18	0.10	0.19	0.20
Threonine	0.06	0.05	0.02	0.08	0.08
Molasses	0.63	2.50	3.50	2.25	2.95
Premix	0.24	0.43	0.30	0.26	0.13
Salt	0.18	0.23	0.25	0.32	0.20
Phyzyme	0.05	0.05	0.05	0.05	0.05
Rice Broken	22.60	0.00	0.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00

Table 2: Nutrient composition of experimental diets

Nutrients					
ME (Kcal/kg)	2800	2800	2800	2800	2800
CP (%)	21.00	20.0	19.00	18.11	17.1
Fat (%)	3.00	4.11	4.10	3.79	4.25
Fiber (%)	4.65	4.31	4.80.	4.14	4.42
Calcium (%)	0.88	0.82	0.80	0.78	0.77
Phos. Avail. (%)	0.44	0.4	0.40	0.4	0.4
Lysine dig. (%)	1.17	1.05	1,05	0.99	0.95
Meth dig. (%)	0.50	0.49	0.48	0.46	0.45
M+C dig. (%)	0.80	0.77	0.76	0.72	0.69
Argin dig. (%)	1.20	1.1	1.1	1.02	0.98
Threo dig. (%)	0.70	0.66	0.65	0.63	0.59
Tryp dig. (%)	0.20	0.18	0.17	0.16	0.15
Isoleu dig. (%)	0.70	0.68	0,65	0.62	0.56
Valine dig. (%)	0.83	0.76	0.70	0.68	0.64

Data Collection: The data on growth performance were collected for the following parameters.

1. Body weight(g)
2. Feed intake(g)
3. Mortality rate (%)
4. Uniformity (%)
5. Point spread
6. Performance index
7. Production efficiency factor

The body weight of individual bird was recorded on weekly basis. Daily feed intake was calculated for estimation of weekly feed conversion ratio (FCR). A complete record of the daily mortality (if any) was maintained. At the end of each week, the uniformity of each replicate was measured. The point spread, performance index and production efficiency factor were also calculated for evaluating the growth performance. Economic impact of phase feeding and stocking densities was also worked out.

Statistical analysis: The data thus collected were analyzed using analysis of variance (ANOVA) technique in Completely Randomized Nested Design (Steel *et al*., 1997). The comparison of means was made through Duncan's Multiple Range (DMR) test (Duncan, 1955) using SAS 9.1 software.

RESULTS AND DISCUSSION

Feed Intake (g): The results of present study showed significantly maximum ($P<0.05$) feed intake in four-phase feeding regime followed by three, one and two, while, stocking density and sex did not show significant effect on the overall feed intake of the birds (Table 4).

Maximum feed intake in 4 phase feeding program may be attributed to splitting of feeding regime in 4 phases keeping in view the requirement for percent crude protein (CP) of birds which varied with rate of growth, as the age advances, the requirement for percent CP decreased. It appears that provision of appropriate space to the birds might have improved their ventilation and comfort level which might have enhanced their ultimate feed intake at 4- phase feeding program.

These results are in line with those of Sahota *et al*. (2012) who reported maximum feed intake in four-phase feeding programs as compared to single phase feeding, while, Pope *et al*. (2002) found no difference in feed intake with diets switched every other day from 42 to 60 days of age. In terms of interaction, significantly (P<0.05) highest feed intake was observed in four-phase feeding at 0.6 sq. ft stocking density in both sexes.

Body weight (g): Overall means (Table 4) showed significant (P<0.05) difference in body weight among phase-feeding regimens, where, maximum weight was attained by birds in four-phase feeding program followed by those maintained on three, two and single-phase feeding programs. In four-phase feeding, the birds were fed according to crude protein percent requirement at specific phase of age which ultimately resulted into more pronounced growth as compared to other treatments because the compensation in body weight gain is more evident for treatments receiving diets with high crude protein or ideal protein levels in the consecutive phase (Eits *et al*., 2003). Similarly Nasril (2003) indicated that intensive multi-phase feeding improved body weight gain and feed to gain ratio in 5^{th} and 6^{th} weeks.

Significantly (P<0.05) highest body weight was achieved by birds reared at 0.7 sq. ft/bird stocking density followed by 0.6 and 0.5 sq. ft. but no significant difference was noted in body weights between sexes. It appears that provision of more space to the birds might have improved their ventilation, comfort and metabolism which resulted into better growth performance. As broilers possess the maximum potential for faster growth rate, therefore, it appears that they might require optimum floor space with increase in their age and body weight (Sahota *et al*., 2012). Mehmood *et al*. (2012) documented the similar effect of stocking density on body weight, where the highest body weight was recorded at maximum stocking density of 0.7 sq. ft/ bird.

In interaction, male and female birds fed four-phase feeding and maintained at 0.7 sq. ft stocking density showed the highest body weight.

Mortality rate (%): The results presented in Table 4, revealed statistically non- significant difference in mortality rate among phase feeding, stocking density and sexes. Similar results are also reported by Reiter and Bessei (2000) indicating that alternation in stocking did not influence mortality rate in birds. Another research reported maximum increase in mortality rate due to higher density in chickens (Dozier *et al*., 2006). Different phase feeding regimens did not influence mortality rate in birds but it has proved to be effective in reducing mortality under acute heat challenge during the finishing period (Basilio *et al*., 2001).

Uniformity (%): Significant (P<0.05) difference was observed in grand means of uniformity in body weight among phase-feeding regimens (Table 5). The highest uniformity was in four phase-feeding followed by two, three and one. It might be due to the provision of nutrients according to the body requirement of the birds at different ages which resulted into uniform body growth. Sklan *et al*., (2000) reported that diet formulated for the first week improved the uniformity of flocks.

The birds reared at 0.7 and 0.6 sq. ft stocking density exhibited significantly better (P<0.05) uniformity as compared to 0.5 sq. ft stocking density which might be due to the availability of ample space which satisfied the bird's natural behavior and resulted into better uniformity, while, non-significant difference was observed between both sexes for uniformity. Sklan *et al*., (2000) reported improved growth and uniformity in birds up to 21 days of age when they were reared at optimum floor space.

Feed Conversion Ratio (FCR), Point Spread (PS), Performance Index (PI) and Production Efficiency Factor (PEF): In the present study overall means showed, significantly (P<0.05) better FCR, in broilers fed at four-phases than those under single-phase feeding program, while, PS, PI and PEF were not influenced by different phase feeding regimes. It seemed that birds maintained under different 4-phase feeding might have fulfilled their nutritional requirements at particular age which reduced nitrogen execration and improved broiler performance by showing their maximum genetic potential (Pope and Emmert, 2001). Similar findings have also been documented in few other reports (Sahota *et al*., 2012 and Mehmood *et al*., 2012), where, better FCR was also observed in four-phase feeding program.

Birds reared at 0.7 sq. ft/bird density demonstrated significantly (P<0.05) improved FCR, PS and PI followed by 0.6 sq.ft and 0.5sq.ft/ bird, while, no difference could be recorded in PEF. It could be due to the fact that birds reared at optimum floor space showed their maximum growth potential by consuming relatively less feed resulting into better FCR, PS and PI. The results of the present study have been fully substantiated by those of Skrbic *et al*. (2008), who reported that; feed efficiency decreased as population density increased. Furthermore, non-significant difference between sexes was recorded.

Economic efficiency: The highest profit was recorded in four feeding program in male (Rs. 32.46) and female (Rs. 25.2) broilers (Table 6 and 7), although, the feed cost was higher in the initial phase due to its high crude protein (CP) contents, however, minimum profit was observed in broilers of both sexes fed single feeding program, which could be attributed to the lowest body weight recorded in the single phase (Saleh *et al*., 1997). Contrary to these results, Gutierrez *et al*. (2008) and Lilburn (1998) suggested that multiphase programs can reduce feed costs per unit weight

In respect of stocking density, the highest profit was recorded at 0.7 s.qft/ bird in both male (Rs. 25.49) and female (Rs.23.8). This could be due to higher live body weight in broilers maintained under less floor space, while, in high stoking density, significantly less profit (17.6) was observed because of low live body weight (Puron *et al*., 1995).

Based on the findings of the present study, it may be stated that growth performance in broilers had positive relationship with phase feeding regimes while an inverse relationship existed between growth performances and stocking density. Four-phase feeding regimen and 0.7 sq. ft/ broiler stocking density appear to be more efficient and economical. Male expressed better growth performance as compared to female broilers. More comprehensive and long term studies are needed to further explore different aspects of phase feeding and stocking density for enhancing growth performance in broilers.

Table 4. Effect of phase feeding and stocking densities on growth performance in sexed broilers.

	Feed Intake (g)	Body Weight (g)	FCR	Mortality %
Phases Feeding				
1-Phase	4606.76±26.87^{b}	2117.49±25.87^{c}	2.17±0.02^{a}	5.16±0.50
2-Phase	4406.81±24.53^{c}	2190.82±30.28^{c}	2.01±0.02^{b}	4.72±0.49
3-Phase	4644.43±30.66^{b}	2307.85±32.77^{b}	2.01±0.03^{b}	5.16±0.51
4-Phase	4758.12±23.82^{a}	2400.86±14.71^{a}	1.98±0.01^{b}	4.83±0.50
Stocking Densities (Sq. ft)				
0.7	4612.14±28.24	2314.29±33.33^{a}	1.99±0.03^{b}	5.00±0.42
0.6	4590.79±36.94	2247.62±28.80^{ab}	2.04±0.02^{ab}	5.08±0.43
0.5	4609.16±38.61	2200.85±30.11^{b}	2.10±0.02^{a}	4.83±0.44
Sexes				
Male	4588.36±45.8	2277.11±43.92	2.02±0.03	5.02±0.60
Female	4619.69±53.75	2231.39±39.22	2.07±0.03	4.91±0.58
Stocking Densities × Phases Feeding (Male)				
0.7 × 1-Phase	4597.50±63.65^{bcdefg}	2209.87±54.48^{cdefg}	2.08±0.06^{def}	4.00±1.52
0.7 × 2-Phase	4403.33±25.65^{ghi}	2358.12±35.58^{abc}	1.86±0.01^{h}	4.66±0.88
0.7 × 3-Phase	4746.83±20.36^{ab}	2421.92±40.80^{a}	1.96±0.02^{fgh}	5.00± 0.57
0.7 × 4-Phase	4715.83±36.18^{abcd}	2409.33±54.57^{a}	1.95±0.04^{fgh}	5.33±0.88
0.6 × 1-Phase	4607.37±58.23^{bcdef}	2052.80±108.38^{gh}	2.25±0.09^{ab}	7.00±2.00
0.6 × 2-Phase	4510.17±42.95^{defgh}	2184.47±71.67^{defgh}	2.06±0.06^{ef}	4.33±2.33
0.6 × 3-Phase	4531.50±45.33^{cdefgh}	2460.65±15.51^{a}	1.84±0.02^{h}	4.00±1.52
0.6 × 4-Phase	4784.60±0.83^{ab}	2417.20±29.36^{a}	1.97±0.02^{efgh}	7.33±1.20
0.5 × 1-Phase	4455.17±12.18^{fghi}	2119.68±60.53^{fgh}	2.10±0.05^{cdef}	5.33±1.45
0.5 × 2-Phase	4349.37±87.19^{hi}	2074.93±30.18^{fgh}	2.09±0.02^{cdef}	5.66±0.88
0.5 × 3-Phase	4619.70±35.58^{bcdef}	2225.35±8.61^{bcdef}	2.07±0.02^{def}	5.00±2.08
0.5 × 4-Phase	4739.00±36.39^{abc}	2391.05±58.23^{a}	1.98±0.05^{efgh}	4.33±0.88
Stocking Densities × Phases Feeding (Female)				
0.7 × 1-Phase	4702.50±43.19^{abcd}	2118.87±35.14^{fgh}	2.22±0.02^{abcd}	5.66±0.88
0.7 × 2-Phase	4400.50±6.24^{ghi}	2308.87±29.38^{abcde}	1.90±0.02^{gh}	4.67±1.76
0.7 × 3-Phase	4675.97±119.50^{abcde}	2308.75±45.62^{abcde}	2.02±0.01^{efg}	6.33±2.33
0.7 × 4-Phase	4784.10±51.62^{ab}	2433.46±34.57^{a}	1.96±0.00^{fgh}	4.33±0.88
0.6 × 1-Phase	4615.67±35.53^{bcdef}	2168.77±53.66^{efgh}	2.13±0.06^{bcde}	3.66±1.45
0.6 × 2-Phase	4489.67±25.25^{efgh}	2140.39±52.78^{fgh}	2.09±0.04^{cdef}	4.00±0.57
0.6 × 3-Phase	4617.10±82.17^{bcdef}	2334.68±14.69^{abcd}	1.97±0.04^{efgh}	5.00±1.15
0.6 × 4-Phase	4827.00±83.75^{a}	2370.10±20.22^{ab}	2.03±0.02^{efg}	2.67±1.20
0.5 × 1-Phase	4662.33±91.71^{abcde}	2034.98±23.88^{h}	2.29±0.03^{a}	6.33±1.20
0.5 × 2-Phase	4287.83±48.79^{hi}	2078.13±22.22^{fgh}	2.06±0.04^{ef}	5.00±1.15
0.5 × 3-Phase	4675.50±99.50^{abcde}	2095.73±77.81^{fgh}	2.23±0.03^{abc}	6.33±0.66
0.5 × 4-Phase	4698.17±103.44^{abcd}	2384.03±28.93^{a}	1.97±0.05^{fgh}	5.66±1.85

[*]Different alphabets on means show significant results at $P<0.05$

Table 5. Effect of phase feeding and stocking densities on production traits in sexed broilers

	Uniformity (%)	Point Spread	Point Index	PEF
Phases Feeding				
1-Phase	37.31±2.38^{b}	275.50±10.06	232.71±6.57	182.24±9.81
2-Phase	45.66±3.02^{ab}	291.30±7.79	247.35±5.44	201.83±9.80
3-Phase	41.45±3.66^{ab}	284.48±7.54	237.37±4.82	187.66±9.31
4-Phase	49.00±2.69^{a}	286.35±8.01	236.35±5.17	190.11±7.93
Stocking Densities (Sq. ft)				
0.7	46.86±2.61^{a}	298.64±9.42^{a}	248.90±6.46^{a}	198.36±9.82
0.6	44.34±2.53^{a}	281.84±4.22^{ab}	236.18±2.44^{ab}	187.99±6.39
0.5	40.86±2.85^{b}	272.74±6.28^{b}	230.26±4.04^{b}	185.03±7.40
Sexes				
Male	42.97±3.57	290.21±9.26	243.09±2.15	193.99±11.55
Female	45.74±3.65	278.60±6.97	233.81±4.35	186.93±8.94
Stocking Densities × Phases (Male)				
0.7 × 1-Phase	47.46±7.16^{abcd}	327.23±20.51^{a}	268.87±15.41^{a}	227.11±30.40^{a}
0.7 × 2-Phase	57.40±3.70^{ab}	313.42±20.67^{ab}	263.65±14.81^{ab}	211.87±24.04^{abc}
0.7 × 3-Phase	44.22±6.02^{abcd}	301.37±6.85^{abcde}	246.07±4.31^{abcde}	195.60±6.96^{abc}
0.7 × 4-Phase	42.16±3.66^{abcd}	311.50±19.75^{abc}	254.50±14.60^{abc}	191.59±11.33^{abc}
0.6 × 1-Phase	30.21±9.2^{cd}	233.76±38.57^{f}	206.82±22.82^{f}	151.89±30.23^{bc}
0.6 × 2-Phase	43.67±11.23^{abcd}	323.29±28.46^{a}	268.68±20.68^{a}	227.21±47.86^{a}
0.6 × 3-Phase	36.25±4.01^{bcd}	315.20±6.16^{ab}	261.16±5.69^{ab}	225.05±25.61^{ab}
0.6 × 4-Phase	37.36±3.73^{bcd}	263.36±27.89^{bcdef}	221.41±17.68^{cdef}	156.56±9.23^{abc}
0.5 × 1-Phase	36.22±3.10^{bcd}	271.93±2.01^{abcdef}	232.11±1.61^{abcdef}	181.65±16.56^{abc}
0.5 × 2-Phase	43.33±4.40^{abcd}	271.38±12.57^{abcdef}	234.15±7.85^{abcdef}	181.57±16.13^{abc}
0.5 × 3-Phase	46.66±10.13^{abcd}	271.08±5.89^{abcdef}	228.35±4.42^{bcdef}	184.02±23.29^{abc}
0.5 × 4-Phase	26.66±12.01^{d}	279.03±5.32^{abcdef}	231.26± 4.16^{abcdef}	193.79±13.51^{abc}
Stocking Densities × Phase Feeding (Female)				
0.7 × 1-Phase	37.80±5.80^{bcd}	294.43±13.32^{abcde}	242.37±8.22^{abcdef}	185.04±18.66^{abc}
0.7 × 2-Phase	40.83±7.20^{abcd}	276.80±9.01^{abcdef}	236.72±6.09^{abcdef}	190.88±20.75^{abc}
0.7 × 3-Phase	60.81±4.21^{a}	282.73±21.52^{abcdef}	235.11±12.09^{abcdef}	178.61±34.84^{abc}
0.7 × 4-Phase	34.56±3.79^{bcd}	307.33±10.42^{abcd}	249.39±6.10^{abcd}	208.32±13.65^{abc}
0.6 × 1-Phase	36.84±5.26^{bcd}	274.98±16.22^{abcdef}	231.42±11.19^{abcdef}	199.60±9.23^{abc}
0.6 × 2-Phase	36.45±6.86^{bcd}	295.23±14.04^{abcde}	247.93±10.48^{abcde}	211.60±14.64^{abc}
0.6 × 3-Phase	50.00±1.51^{abc}	294.51±3.40^{abcde}	244.17± 1.95^{abcdef}	192.22±17.32^{abc}
0.6 × 4-Phase	47.36±10.52^{abcd}	304.10±16.55^{abcd}	246.38±10.03^{abcde}	228.01±16.54^{a}
0.5 × 1-Phase	35.30±1.87^{bcd}	250.644±10.19^{def}	214.66±7.05^{def}	148.13±12.90^{c}
0.5 × 2-Phase	52.28±7.71^{abc}	267.66±8.70^{abcdef}	232.97±7.06^{abcdef}	187.84±18.70^{abc}
0.5 × 3-Phase	56.06±2.14^{ab}	242.01±25.46^{ef}	209.36±13.70^{ef}	150.49±13.63^{bc}
0.5 × 4-Phase	60.62±6.58^{a}	252.76±12.01^{cdef}	215.18±6.11^{def}	162.39±22.75^{abc}

*Different alphabets on means show significant results at P<0.05

Table 6: Effect of different phase feeding regimes (PF), stocking densities (SD) and sex (male) on economics

Parameters	Economics (Rs)						
	Male				Male		
	Phases				Stoking Density (sq. ft.)		
	1	2	3	4	0.7	0.6	0.5
Cost of day old broiler chick	35	35	35	35	35	35	35
Avg. feed consumed (Kg)	4.59	4.40	4.73	4.71	4.59	4.6	4.45
Avg. feed price / Kg (Rs)	34	35	38	39	37	37	37
Total feed cost (Rs)	156	154	179	183	169.83	170.2	164.65
Miscellaneous cost per bird (Rs)	30	30	30	30	30	30	30
Total cost per bird (Rs)	221	219	244	248	234.83	235.2	229.65

Total live weight per bird (Kg)	2.15	2.23	2.56	2.68	2.36	2.3	2.21
Market price/ Kg live wt. (Rs)	125	125	125	125	125	125	125
Avg. cost / Kg live weight (Rs)	102.70	98.20	95.32	92.53	99.50	102.26	103.91
Avg. profit/ Kg live weight (Rs)	22.20	26.79	29.68	32.46	25.49	22.73	21.08

Table 7. Effect of different phase feeding regimes (PF), stocking densities (SD) and sex (female) on economics

	Economics (Rs)						
	Female				**Female**		
Parameters	**Phases**				**Stoking Density (sq. ft.)**		
	1	2	3	4	0.7	0.6	0.5
Cost of day old broiler chick	35	35	35	35	35	35	35
Avg. feed consumed (Kg)	4.72	4.4	4.67	4.78	4.7	4.61	4.66
Avg. feed price / Kg (Rs)	34	35	38	39	37	37	37
Total feed cost (Rs)	160.4	154	177.4	186.4	173.9	170.6	172.4
Miscellaneous cost per bird (Rs)	30	30	30	30	30	30	30
Total cost per bird (Rs)	225.4	219	242.6	251.4	238.9	235.6	237.4
Total live weight per bird (Kg)	2.15	2.11	2.40	2.52	2.36	2.3	2.21
Market price/ Kg live wt. (Rs)	125	125	125	125	125	125	125
Avg. cost / Kg live weight (Rs)	104.9	103.8	101.0	99.7	101.2	102.4	107.4
Avg. profit/ Kg live weight (Rs)	20.1	21.2	23.9	25.2	23.8	22.6	17.6

REFERENCES

Anonymous. (2013). Economic Survey of Pakistan (2012-13). (Ministry of Finance. Finance Division, Economics Advisor’s Wing., Government of Pakistan, Islamabad Pakistan), pp:30.

Basilio, V., M. Vilarino, S. Yahav and M. Picard (2001). Early age thermal conditioning and a dual feeding program for male broilers challenged by heat stress. Poultry Sci., 80:29-36.

Baker, D. (1997). Ideal amino acid profiles for swine and poultry and their application in feed formulation. In “Biokyowa Technical Review” Biokyowa Press, St. Louis, MO, 9:1-s24.

Baker, D. and Y. Han (1994). Ideal amino acid profile for chicks during the first three weeks post hatching. Poultry Sci., 73:1441-1447.

Dawkins, M. S., C. A. Donnelly and T. A. Jones (2004). Chicken welfare is influenced more by housing conditions than by stocking density. Nature, 427: 342-244.

Dozier III, W.A., J. P. Thaxton, S. L. Branton, G. W. Morgan, D. M. Miles, W. B. Roush, B. D. Lott and Y. Vizzier-Thaxton (2005). Stocking density effects on growth performance and processing yields of heavy broilers. Poultry Sci., 84:1332-1338.

Dozier III W. A., J. P. Thaxton, J. L. Purswell, H. A. Olanrewaju, S. L. Branton and W. B. Roush (2006). Stocking density effects on male broilers grown to 1.8 kilograms of body weight. Poultry Sci., 85: 344-351.

Duncan, D. B. (1955). Multiple Range and Multiple F tests Biometrics, 11: 1-42.

Eits, R. M., R. P. Kwakkel, M. W. A. Verstegen and G. C. Emmans (2003). Responses of broiler chickens to dietary protein: Effects of early life protein nutrition on later responses. Brit. Poultry. Sci., 44: 398-409.

Emmert, J. L. and D. H. Baker (1997). Use of the ideal protein concept for precision formulation of amino acid levels in broiler diets. J. Appl. Poult. Res., 6:462-470.

Gutierrez, O., N. Surbakti, A. Haq, J. B. Carey and C. A. Bailey (2008). Effect of continuous multiphase feeding schedules on nitrogen excretion and broiler performance. J. Appl. Poult. Res., 17: 463-470.

Hubbard, M. G. (2012). Ed1. 1000 ex.- 04/2006- Ed2 1000 ex. -07/2012.

Lilburn, M. S. (1998). Practical aspect of early nutrition for poultry. J. Appl. Poult. Res., 7: 420-428.

Mehmood, S., A. W. Sahota, M. Akram, A. S. Jatoi and K. Javed (2012). Growth performance, breast yield and economics in sexed broiler chickens influenced by different phase feeding program. Abst. National Sci. Conf. on “Agriculture and food security issues in global environmental perspectives” The University of Poonch, Rawalakot, Azad Jammu and Kashmir, pp: 281.

Nasril, J. (2003). Continuous multiple-phase feeding of broiler chickens. PhD thesis,Texas A&M University,USA.

Nutrient Requirements of Poultry. 9th Revised Edition (1994). National Research Council, National

Academy of Sciences, National Academy Press, 2101 Constitution Ave, Washington, DC 20418.

Pope, T. and J. L. Emmert (2001). Phase-feeding supports maximum growth performance of broiler chicks from forty-three to seventy-one days of age. Poultry Sci., 80:345-352.

Pope, T., L. N. Loupe, J. A. Townsend and J. L.Emmert (2002). Growth performance of broilers using a phase-feeding approach with diets switched every other day from forty-two to sixty-three days of age. Poultry Sci., 81: 466-471.

Puron, D., R. Santamaria, J. C. Segaura and J. L. Alamilla (1995). Broiler performance at different stocking densities. J. Appl. Poult. Res., 58:791-793.

Reiter, K. and W. Bessei (2000). The behaviour of broilers in response to group size and stocking density. Arch. Geflugelk, 64:93-98.

Sahota, A. W., S. Mehmood, M. Akram, A. S. Jatoi and K. Javed (2012). Growth performance, breast yield and economics in sexed broiler chickens influenced by different phase feeding programs.Book of proceedings, National Sci. Conf. “Agriculture and food security issues in global environmental perspectives” The University of Poonch, Rawalakot, Azad Jammu and Kashmir, pp: 280.

Saleh, E. A., S. E. Watkins and I. M. Waldrop (1997). Changing time of feeding starter, grower and finisher diet for broiler bird grown to 3.3 kg. J. Appl. Poult. Res., 6: 290-297.

Skbric, Z., Z. Pavlovski, M. Lukic and M. Blagojevic (2008). Carcass quality of broilers reared in lower stocking density and in conditions of discontinuous light program In 1st Mediterranean Summit of WPSA “Advances and Challenges in Poultry Science” pp. 1028-1032. Book of Proceedings, Porto Carras, Greece.

Sklan, D., Y. Nox, A. Hoyzman, I. Rozenboim (2000). Decreasing weight loss in the hatchery by feeding chicks and poults in hatchery trays. J. Appl. Poult. Res., 9: 2142-2148.

Steel, R. G. D., J. H. Torrie and D. A. Dickey (1997). Principles and procedures of statistics, Mcgraw-Hill; New York.