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EVALUATION OF PARENT AND GRAND-PARENT LINES OF COMMERCIAL BROILER BREEDS AT GHOUT ELSULTAN AND TAWARGHA PROJECTS

BY

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Table of Contents

List of Figures

List of Tables

List of Appendixes

Summary

The use of commercial breeds in Libyan region climate may result in large economic losses because genotypes selected in temperate climates may respond differently to the high ambient temperature in hot regions and seasons. Furthermore, commercial breeds must be tested in hot climates in order to find the one most suited to these conditions. For this purpose three commercial breeds (Hypeco, Avian, and Shaver) was evaluated in two Libyan costal regions according different seasons and years. The data were obtained from weekly records of three flocks of grandparent lines (from each breed) and three flocks of their progeny (Parent lines) from two broiler breeder projects (Ghout El-sultan and Tawargha). Total population used in this study was 1.271.152 birds, out of which 697.622 birds attained sexual maturity and were housed in laying houses in both grandparents and parents. Feed intake, live body weight, egg production, and cumulative mortality percent were the studied traits. The study showed significant differences between projects in production periods, especially in parent lines. There were highly significant differences ($P<0.01$) between breeds in all traits. However, Hypeco breed seems to be superior to Avian and Shaver and could be grown uniformly under Libyan conditions. The breeds exhibited different responses to the different (months) seasons in Libya. The differences in the performance of the different breeds during the different years reflex the importance of the effect of managerial factors. In conclusion, the differences which exhibited between the breeds in all studied traits indicate that the genetic and selection histories are different.

Introduction

Broiler breeder production is one of the profitable production activities than broiler and layer production. Breeder farming is not that simple and easy, as it requires special rearing environment and huge investment than any other poultry production activity. Thus, farmers involved in broiler breeder production should keep a vigilant eye on management and better care and know the important production traits to make it more profitable.

The great scientific and technological development of poultry industry in the last years demanded evaluation of different commercial broiler lines, as well as different handling techniques, in order to improve production efficiency and help in decision-making. In a world scale, there is a great tendency for increasing chicken meat consumption. The genetic background of a broiler chicken can have a significant impact on how the particular strain will be used by the commercial poultry producer.

Commercial producer must closely monitor their respective markets to insure that production goals are in-line with market out look. Therefore, production strategies must consider not only nutrition, but also the genetic background of the particular broiler strain being utilized.

The commercially grown broiler usually is a crossbred from specialized purebred sire and dam lines. The position of a purebred line in the crossbreeding system influences its genetic contribution to expression of productive and reproductive performance at different stages of the production column and thus, Influences the breeding goal for a given line.

The use of standard broiler stocks in hot climates may result in large economic losses because genotypes selected in temperate climates may respond differently to high ambient temperature in hot regions and then, it is better that standard broiler stocks must be tested on hot climates in order to find the most suited one.

In Libya, however, broiler meat is favourable for consumption, for this purpose, many broiler projects established. All of these projects using standard broiler stocks which selected for temperate climates, whereas, Libyan climate attend to hot, dry, and humid during summer, moderate-warm in winter with some variations between different locations.

Therefore, the objectives of this study were:

1) Investigate the environmental and managerial factors affecting the performance of the commercial breeds Hypeco, Avian, and Shaver during Parent and Grandparent lines.
2) Compare performance traits for these commercial breeds during rearing and production periods of Parent and Grandparent lines.

Review of Literature

- **Feed traits:**

In laying hens, the differences in body weight were found to be related to daily feed intake which increases in a linear fashion as body weight increased. It was also found that 6.80g more feed was consumed daily by each hen for each 100g of body weight (Harms *et al.* 1982). Birds grown at 15.6 c° consumed more feed per unit of weight than at two other temperature (21.1c°, 26.7 c°), also, the growth rates at 26.7c° were 6% less at 35days and 10% less at 55days than at 15.6 c°(Reece and Lott 1983). The weight of the birds determines the quantity of feed given. Furthermore, feed intake depends on the average weight on the moment of selection. A and B lines (Male lines) need more feed than C and D lines (Female lines) (Hypeco breed Management Guide 1987).

Two commercial broiler lines differing in efficiency of feed utilization were evaluated, it was found that the line by diet was seldom significant and line effects were greater than those between diets. Chicks from the more efficient line had less plumage cover, less fat, and spent more time sitting than those from the less efficient line (Cahaner, *et al.* 1987). Females should be preferred over males for broiler production in hot facilities or locations. That's because the reduction in body weight and feed efficiency due to the high temperature increased with age and were higher in males than in females (Cahaner and Leenstra 1992).

There is a striking difference in mature body weight (BW) between egg-type hens and broiler breeder when these birds are allowed to eat *ad libitum*. That's why, broiler breeder chickens require dedicated programs of feed restriction to maximize egg production and chick production. The optimum degree of feed restriction is difficult to define due to strain differences and continual changes in the genetic composition of stocks by primary breeder (Robinson, *et al.* 1993). Selection should take place at a weight appropriate for the local broiler market, this typically occurs at around 6 weeks of age. The actual feed amount will vary depending on factors such as housing conditions, temperature, feed quality, body weight, uniformity, beak trimming, and flock health (Avian breed Management Guide 1994).

In cases in which locations are quite similar in their general climatic and management conditions, genotype by environment interaction have been found to be not significant, especially for egg production traits Mathur and Horst (1994). Differences between many genotypes were evaluated. The differences between genotypes indicate that the nutrient and environment requirements of these genotypes would be different. A description of each genotype, therefore, is an essential component of any simulation model that attempts to determine the optimum economic feeding programme and environmental conditions for broilers (Hancock, *et al.* 1995). Smaller birds, however, eat less feed and produce smaller eggs (Leeson, *et al.* 1997). Feed consumption was affected by climate, it decreased as ambient temperatures increased but not by genotype (Yalcin *et al.* 1997b). Also, feed to gain increased as body weight increased (May *et al.* 1998).

The commercially grown broiler usually is a crossbred from specialized sire and dam lines. As a result, the position of purebred line in the crossbreeding system influence its genetic contribution to expression of productive and reproductive performance at different stages of the production column and, thus influence the breeding goal for a given line (Jiang *et al.* 1999). Production strategies must consider not only nutrition, but also the genetic background of the particular broiler strain being utilized (Lilburn 2000). High ambient temperature reduce feed consumption and body weight in broilers, thereby leading to lower efficiency and profitability of poultry meat production in hot climates. These negative effects, however, have been found to be more pronounced in chicken lines with high body weight (Deeb and Cahaner, 2001a). Commercial fast growing and local slower growing stocks were investigated under heat stress and food restricted conditions, results recommended that the food conversion was higher for local stock than the other commercial stocks. Furthermore, the management procedures used to improve food conversion (Yalcin, *et al.* 2001). Feed consumption and efficiency of feed utilization by egg type layers for egg production were studied. Higher feed consumption was recorded for, Babcock than Hisex strains, for medium and small flocks compared with large flocks, for flocks under good compared with poor hygienic conditions, and in low density compared with high density housing (Farooq, *et al.* 2002). ISA-Veddete breed was the highest in respect of body weight and feed intake followed by Hybro and Arbor respectively, so, ISA-Veddete is the most suitable strain in tropical environment in comparison with the other strains (Sarker *et al.* 2002).

Sex effect on behaviour of two commercial broilers lines was evaluated. Ross line, however showed higher final weight and weight gain, better intake, and feed conversion rate. Also, it was observed that females of both lines had similar results in relation to previous parameters (Rondelli, *et al.* 2003). Two dam lines pullets that produce heavy broiler with increased breast yield (A and B) were compared with pullets from commercial line which has not the extremes in breast yield (C), the information gathered were suggested that line (C) may prove to be useful for reproductive comparisons with commercial lines exhibiting significant differences in caracas traits (Reddish and Lilburn 2004).

The impact of genotype and outdoor access on growth rate and carcass yield was assessed. Weight gain was similar among genotypes, but males gained more weight than females. The slow-growing and commercial fast growing genotypes had the highest and lowest feed intake, consequently, the lowest and highest feed efficiency, respectively (Fanatico, *et al.* 2005).

- **Live body weight**

Two commercial broiler lines (Hubbard, Arbor Acrees) were evaluated under different types of litter and population density, it was indicated that Hubbard chicks had significantly higher daily gain from hatching to 45 days and higher meat production per unit of space (Mizubuti, *et al.* 1994). Highly significant differences were recorded between strains and between sexes in their mature weights, indicating that their rates of growth were different. At the same time, differences of the rates of maturing of the different genotypes were not significantly (Hancock, *et al.* 1995). The mean live weight at 45 days old of five flocks of Hybro normal offspring was low compared with Hybro giant (Barbour *et al.* 1996).

The differences were observed between lines in the average weight at hatching and feed conversion efficiency. Also, Males had a higher body weight at 51 days, better feed conversion and higher index of production efficiency than females (Custodio *et al.* 1997). Significant between-strain variation still exits due to differences in selection emphasis and selection techniques by breeding companies and greater than 10% variation between broiler crosses for body weight, growth rate, and feed conversion were observed (Emmerson, 1997).

Natural heat stress reduces growth rate. It was reported that the body weight at 7 wk of age and BW gain from 4-7 wk of three commercial broiler stocks were lower in summer than in spring by 23 and 33 %. Also, season by stock interaction detected for body weight (Yalcin *et al.* 1997a). Body weight at 7wk and weight gain (WG) at 4to 7 wk were lower in the hot summer than in the cool spring by 8 and 14 %, respectively, in naked neck broiler, and by 13 and 22%, respectively, in their fully feathered counterparts (Yalcin *et al.* 1997b). Seasons by genotype interaction effect on the performance of commercial broiler were evaluated, it was found that genotypes that gain more weight in the spring tended to gain less weight under hot conditions of summer. However, these interactions suggest the presence of substantial genetic variation in the magnitude of heat tolerance (Settar, *et al.* 1999). Reduction in weight gain because of high ambient temperature was greater in high growth rate birds than in low growth rate birds, but in both stocks studied, the high ambient temperature effect was greater on normally feathered birds than on other genotypes. Because of the continuous selection of broiler for more rapid growth, future broilers are expected to be more sensitive to heat stress (Yunis and Cahaner, 1999).

The increase in sexual dimorphism with body weight could be reduced by selecting animals on body weight at two ages instead of one, as is usually done in commercial lines (Mignon-Grasteau, *et al.* 2000).The high ambient temperature reduced growth and meat yield in the progeny of all genotype groups but this reduction increased with age and was highest in the broilers produced by hens from a sire line bred for high growth rate. However, the magnitude of the high ambient temperature effect depends not only on differences in potential growth rate but also on differences in overall genetic background (Deeb and Cahaner, 2001-b).

The body weight was lower for local stock (slower-growing synthetic stock improved in Turkey) than the other studied commercial stocks (Yalcin, *et al.* 2001). Different genetic groups of broiler breeds were evaluated using multivariate analysis of variance (Viana, *et al.* 2001). The genotype effect was found to be significant, but no significant genotype differences for age at sexual maturity, as well as for egg number were observed in all study periods. However, significant genotype difference for body weight was observed only in the initial period.

Each of heat and cold stress responses may share similar control of the genetic variation in each trait and their negative genetic correlation with potential growth rate (Deeb, *et al.* 2002). Different commercial broiler strains (conformation vs. conventional) were evaluated (Moreira, *et al.* 2003), it was shown that growth rate differed between strains and sex. Higher growth rate among the conformation and conventional strains were also recorded. Strains also differed in live weight gain, feed intake and feed: gain ratio. Live weight gain was highest in winter, lowest in rainy and intermediate in summer and the differences were observed between breeds in all seasons (Rahman *et al.* 2003).They concluded that Hubbard seems to be superior to Starbo breed under rural environment in Bangladesh. Growth curve and performance of two broiler strains, Paraiso Pedres (PP) and ISA Label (ISA), raised in confined or semi-confined were evaluated (Santos, *et al.* 2005). Semi-confined PP and ISA birds showed higher growth potential, higher weight gain, lower feed intake and better feed-to-gain ratio than confined birds. Also, (PP) breed showed better growth potential and performance.

- **Egg traits:**

Egg production traits were not different between body weight groups (Harms *et al.* 1982).There was a strong negative relationship between body weight and reproductive efficiency in domestic poultry and the strength of this relationship was evident by the existence of two types of chickens of commercial significance that represent opposite extremes in body weight (BW) and reproductive efficiency. For that, parents of meat-type poultry must not only have the genetic potential to exhibit fast and efficient growth, but also be efficient in reproductive efficiency (Robinson, *et al.* 1993).

The Hybro normal parents had higher average daily egg production compared with hybro giant parents during the same age. Also, the percentage hatchability was lower in eggs collected from the hybro giant birds (Barbour *et al.* 1996).

Comparative evaluation for two breeds (broiler & egg-type) was done (Abiola, *et al.* 2003). They suggested that the strains of parental lines can affect the hatchability of the eggs. Egg production performances of a breed and three crossbreeds under semi-scavenging system of management were studied under Bangladesh condition (Zaman *et al.*., 2004). It was suggested that the locations did not had an effect on age at sexual maturity and egg production. The Harco sex line shown adaptability and high production of eggs on different diets compared to the criolla hens (Altamirano 2005)

- **Mortality Percent:**

The performance of diallel crosses between four lines of commercial broilers in Brazil was compared with two control lines of commercial broilers (Schmidt, *et al.* 1991). Birds in the crossbred lines had higher body weight than controls at 28, 49 days, but there were no significant differences between any of the lines in feed conversion efficiency or mortality. Hybro giant parent males had higher average daily mortality comparing with Hybro normal, but females of Hybro normal parents recorded higher daily mortality during the same age (Barbour, *et al.* 1996). Commercial broiler lines were evaluated using Cobb I, Cob II, and Hubbard-Peterson (HP) breeds (Custodio, *et al.* 1997). However, Cobb birds performing peter than Hubbard birds, and the survival rate at 51 days was lower in Hubbard than in Cobb birds. When commercial fast growing and local slower growing stocks were investigated under heat stress and food restricted conditions (Yalcin, *et al.* 2001), results recommended that the mortality were lower for local stock than the other commercial stocks. Furthermore, the management procedures used lowered mortality.

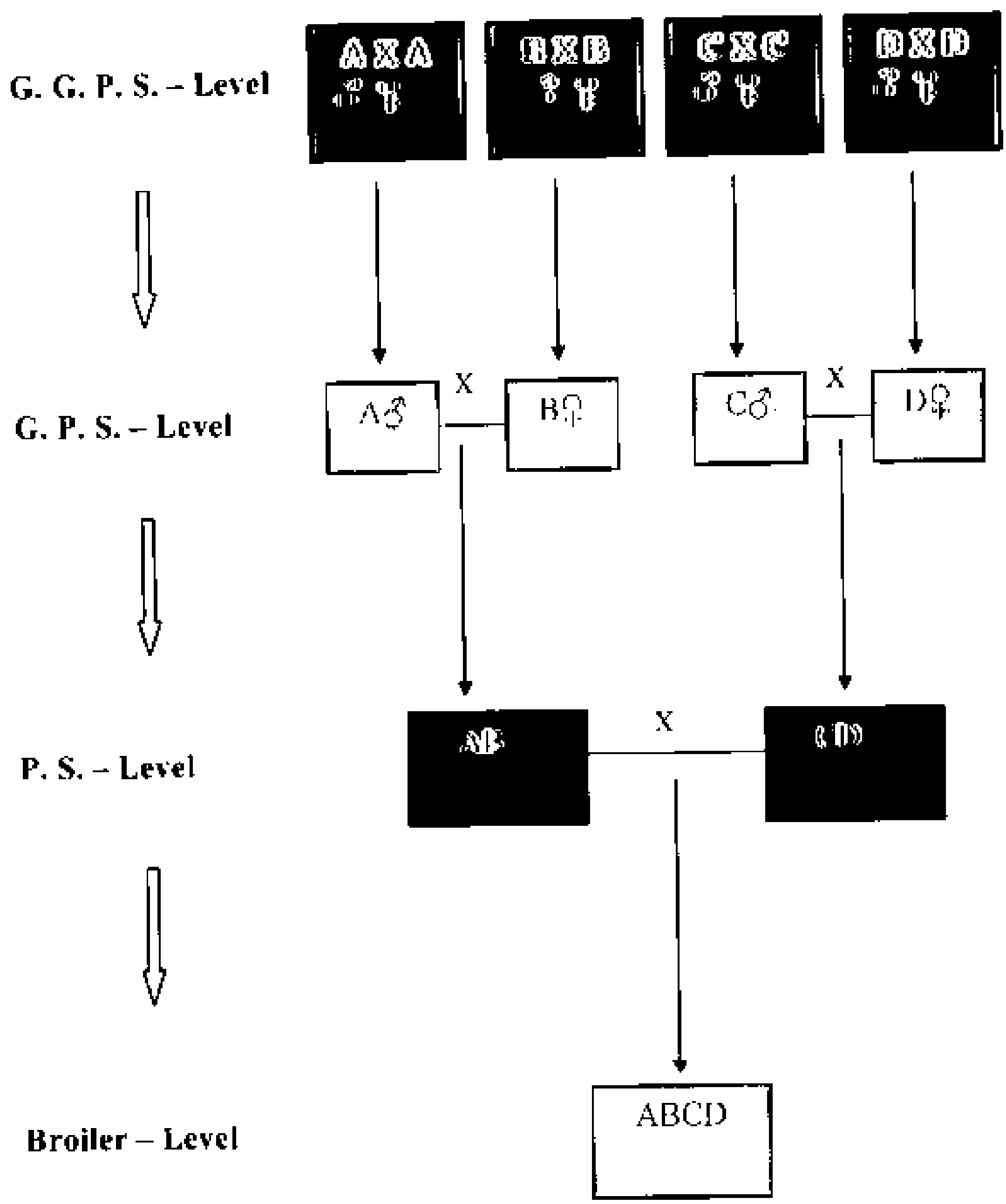
Supplementary levels of feed, breeds, and locations did not affect mortality under semi-scavenging system of management (Zaman, *et al.*, 2004). Mortality, feed conversion and final weight showed significant differences under controlled and conventional conditions (Ramirez, *et al.* 2005). In controlled conditions broilers achieve better growth and farmers obtain higher yield and profits.

Material and methods

On the increasing demand on poultry meat, many projects established by the Libyan government to cover the market requirements. Ghout El-Sultan and Tawargha are examples of these projects. The first project (Ghout El-sultan) located at the east side of Libya on the width line (32) and longitude line (21). It rises over sea surface about (300mts). The temperature average in this area between (6- 17 c) and (18-33c) in winter and summer respectively. The average yearly rain fall in this region is between (200-400mm). The other project (Tawargha) is located at the west side, on the width line (32) and longitude line (15). It rises over sea surface about (7mts). The average temperature is (12), (25) in winter and summer respectively, and the average rain fall was about (125 mm) yearly. These projects concern with poultry broiler breeding. The breeding programme consists of three stages as explained in (Figure 1). Grand parent flocks is the first stage. It was divided in two management periods, rearing period (from 1-22 weeks) and production period (from 23-60 weeks). Also, these flocks consist of two lines, male line (Father Side) and Female line (Mother Side). Male lines include two sex segment, (A) male segment and (B) female segment which. In the same condition, female line includes Males segment (c) and Females segment (D).

The management program in both lines includes two periods, rearing period from 1-22 weeks of age, and production period which begins from 23 weeks of age to the end of the production cycle. During rearing period, males and females reared separately until 20 weeks of age, then, matting done. The first selection done at 6 weeks of age, it depends on heaviest, excellent conformation, and freedom from physical defects. The second selection is used at 18 weeks of age. The production period begins at sexual maturity (the age at first egg). The flocks reach 50% of lay at 25-26

Figure 1: Broiler breeders breeding scheme:



weeks of age, whereas, they reach the peak of lay at 29-31 weeks of age. The final production of the grand parent flocks is a fertile eggs incubated in grand-parent hatchery to produce parent males and females chicks.

The second stage of the breeding program is a parent flocks which are a progeny of grand-parent male and female lines. The chicks reared separately at the rearing period until the matting age (20-22 wks). The selection in the parent flocks is less than it was in the grand-parent. The other management routine operations are equally in both parent and grand-parent flocks. At the production period (23-60 wks) fertile eggs are produced then incubated in parent hatchery to produce commercial hybrid chicks. These chicks reared at the broiler farms from 1- 50 days old then slaughtered.

The projects were managed by HVA Holland Company from 1983 to 1991. Later the projects were managed by Libyan Authority.

Data Collection:

Data were collected of three commercial breeds maintained in Ghout-El-sultan and Tawargha poultry and dairy projects for grand-parent and parent lines. The study was based on the data records for three commercial breeds that have been reared by two different managements for many seasons and years at Ghout-El-sultan and Tawargha poultry and dairy projects. The breeds which used in this study are Hypeco (In the period from 1986-1991), Avian (1993-1996), and Shaver (1998-2001) standard breeds.

The total population used in this study was 1.271.152 birds, out of which 697.622 birds attained sexual maturity and were housed in laying houses in both grandparents and parents. In grandparents, total birds received were 93744, out of which 55774 birds attained sexual maturity and were housed in laying houses (Table.1). But in parent lines, the average number of birds studied in both projects and breeds was 1177408, out of which

641848 birds attained sexual maturity and were housed in laying houses (Table.2). The data which was used in the current study collected from the flocks weekly records. These records were include information's such as cumulative mortality, daily feed consumption (FBD), weekly cumulative feed per bird (CFB), hen housed feed consumption (FHH), weekly body weight, percent hen-day egg production, Percent hen-day hatching egg production, hen housed egg production, and hen housed hatching egg production.

Measurements:

Body weight:

Body weight scaling was done weekly according samples of 2% of the lines with a maximum of 100 birds generally is sufficient to determine the average weight.

Feed consumption:

Feed consumption was accounted daily by means automatic scaling pelts. Weekly feed consumption obtained by summarizing the daily feed consumption. Weekly feed consumption was cumulated during all the age weeks. The daily feed consumption (GMS) per bird (FBD) was calculated using the following equation:

$$\textit{Daily feed consumption per bird GMS} = \frac{\textit{weekly feed consum. (KGS)} \times 1000 \div 7}{\textit{number of available birds}}$$

Whereas, cumulative feed consumption (KGS) per bird (CFB) was calculated by using the following equation:

$$\textit{Weekly cum. feed consumption / bird (KGS)} = \frac{\textit{weekly cum. feed consum. (KGS)}}{\textit{number of available birds}}$$

Table.1 Grand parent lines studied population distribution:

Period	Project	Breed	Male	Female	Total
Rearing	Ghout.	Hypeco	5539	10871	16410
		Avian	4879	10680	15559
		Shaver	4921	10428	15349
		Total	**15339**	**31979**	**47318**
	Tawargha	Hypeco	5608	11101	16709
		Avian	3817	9550	13367
		Shaver	5250	11100	16350
		Total	**14675**	**31751**	**46426**
	Total		***30014***	***63730***	***93744***
Production	Ghout.	Hypeco	1865	7060	8925
		Avian	1987	7859	9846
		Shaver	2005	7777	9782
		Total	**5857**	**22696**	**28553**
	Tawargha	Hypeco	1737	6663	8400
		Avian	1848	7083	8931
		Shaver	2133	7757	9890
		Total	**5718**	**21503**	**27221**
	Total		***11575***	***44199***	***55774***
Total			41589	107929	149518

Table.2 Parent lines studied population distribution:

Period	Project	Breed	Male	Female	Total
Rearing	Ghout.	Hypeco	17384	99252	116636
		Avian	20170	109571	129741
		Shaver	34425	108309	142734
		Total	**71979**	**317132**	**389111**
	Tawargha	Hypeco	17679	99478	117157
		Avian	23635	104647	128282
		Shaver	44123	109624	153747
		Total	**85437**	**313749**	**399186**
	Total		***229395***	***948013***	***1177408***
Production	Ghout.	Hypeco	13591	95686	109277
		Avian	14297	90308	104605
		Shaver	13329	95111	108440
		Total	**41217**	**281105**	**322322**
	Tawargha	Hypeco	11224	97628	108852
		Avian	13024	96880	109904
		Shaver	11688	89082	100770
		Total	**35936**	**283590**	**319526**
	Total		***77153***	***564695***	***641848***
Total			306548	1512708	1819256

On the other hand, weekly hen or bird-housed feed consumption (KGS) was estimated as following:

$$Hen\ or\ (birds) - housed\,feed\ consum.\ (KGS) = \frac{Weekly\,cum.\ feed\ consum.(KGS)}{number\ of\ birds\ or\ (hens)\ housed}$$

Percentage of cumulative mortality:

In both projects and breeds during all periods mortality were recorded daily. At the end of the week, daily mortality was summarised as cumulative mortality. The cumulative mortality at all periods and ages include culls birds. However, weekly cumulative mortality percent was estimated as following:

$$Percent\ of\ cumulative\ mortality = \frac{weekly\ cumulative\ mortlity}{total\ number\ of\ birds\ housed} \times 100$$

Egg traits:

During production periods, eggs laid were collected daily. The weekly egg production was cumulated in a weekly cumulative egg production. After egg collection operation, testing operations were worked out to separate the hatching egg for incubation.

The egg traits which estimated were percentage of hen-day and hen-hatching egg production, hen-housed egg production, and hen-housed hatching egg production.

Percentage of hen-day egg production was estimated by using the following formula:

$$Hen - day\ egg\ production\ \% = \frac{number\ of\ eggs\ produced\ weekly\ \div 7}{number\ of\ available\ hens} \times 100$$

Percent hen-day hatching egg production for the whole periods was calculated by summing up the hen-day hatching eggs as a cumulative weekly production, and then the percent was estimated as the following:

$$Hen - day\ hatch.\ egg\ production\ \% = \frac{weekly\ hatch.\ eggs + 7}{number\ of\ available\ hens} \times 100$$

Hen housed egg production was worked using the following formula:

$$Hen - housed\ egg\ production = \frac{total\ eggs\ produced\ by\ a\ flock\ (cum.\ eggs)}{total\ number\ of\ hens\ housed}$$

Whereas, hen housed hatching egg production was estimated as following:

$$Hen\ housed\ hatch.\ egg\ prod. = \frac{total\ hath.\ eggs\ produced\ by\ a\ flock\ (cum.\ eggs)}{total\ number\ of\ hen\ housed}$$

Statistical analysis:

Data was subjected to statistical analysis by using the STATISTICA computer program manual. The design used was nested breed within year as the following general model:

$$Y_{ijk...s} = \mu + P_i + B_j + G_k + F_l + H_m + L_n + X_o + S_p + M_q + Y_r + A_s + e_{ijk...s}$$

Whereas:

- $Y_{ijkl....t}$ = Traits studied.
- μ = overall mean.
- P_i = the fixed effect of location (project) i (i = 1, 2).
- B_j = the effect of breed j whiten year s (j = 1, 2, 3).
- G_k = the effect of grandparent flock k (k=1, 2.....18).
- F_l = the fixed effect flock l (l = 1, 2 ...9).
- H_m = the fixed effect of house m (m=1, 2).
- L_n = the fixed effect of line l (l = 1, 2).
- X_o= the effect of sex segments m writhen line n (m = 1, 2, 3, 4).
- S_p = the fixed effect of bird sex p (p=1, 2).
- M_q= the fixed effect of months r (r = 1, 2, 3, ..., 12) ;

- Y_r = the fixed effect of years s (s = 1. 2, 3… n).
- A_s = the random effect of age t (t = 1, 2, 3… n).
- $e_{ijkl...s}$ = the unexplained residuals.

The general model used for grand parent rearing period except that, its not include the effects of houses, birds sex, and grand parent flocks.

For grand parents production period, the same model to analysis Grand parent rearing period were used except that, it is not include the effect of sex segment.

For parent rearing and production periods, the general model was used except that, the effect of lines and sex segments were deleted. Multiple comparisons among the factors were tested by LSD least significant differences.

Results

1. Grand parent lines results:

1.1. Rearing period

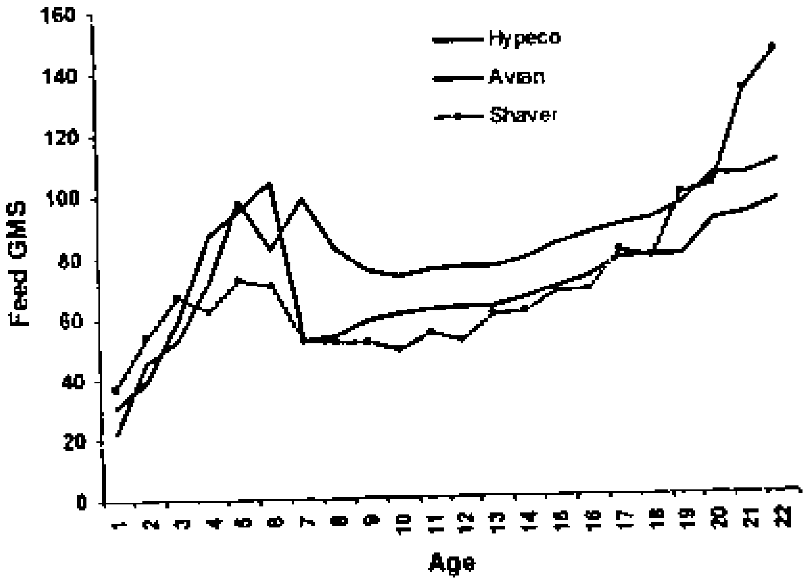
1.1.1. Feed Traits

a - Bird daily feed consumption (GMS):

Table.1 (Appendix) shows the variance components for the factors studied in daily feed consumption. All factors included in the model were found significantly affect, except projects and months.

Means of the breeds for feed traits, live body weight, and mortality percent are presented in (Table. 3). The Avian breed had the highest ($P<0.05$) amount of feed consumption followed by Hypeco. However, the relationship between age (wks) and daily feed consumption is presented in (Figure.2).

Figure.2 The relationship between bird-daily feed consumption and age for different breeds (G-P-Rearing).



The flocks had significant ($p<0.0001$) effect on the daily feed consumption of the birds. However, there were significant differences ($p<0.001$) between male and female lines.

Table.3 Mean and standard error of feed traits, live body weight, and percentage of mortality for different breeds (GP Rearing Period).

Breed	N	Feed / Bird / Day GMS	Cum./Feed / Bird KGS	Feed/Birds/Housed KGS	Weight GMS	Mortality %
		Mean ± S.E	Mean ± S.E	Mean ± S.E	Mean ± S.E	
Hypeco	400	72.621 ± 2.676^{b}	11.942 ± 0.526^{a}	3.885 ± 0.086^{c}	1683 ± 31.382^{b}	10.131^{b}
Avian	419	82.487 ± 1.330^{a}	10.152 ± 0.374^{b}	4.380 ± 0.104^{a}	1850 ± 40.803^{a}	9.331^{c}
Shaver	396	69.030 ± 1.409^{b}	7.533 ± 0.330^{c}	4.055 ± 0.169^{b}	1594 ± 34.803^{c}	10.830^{a}

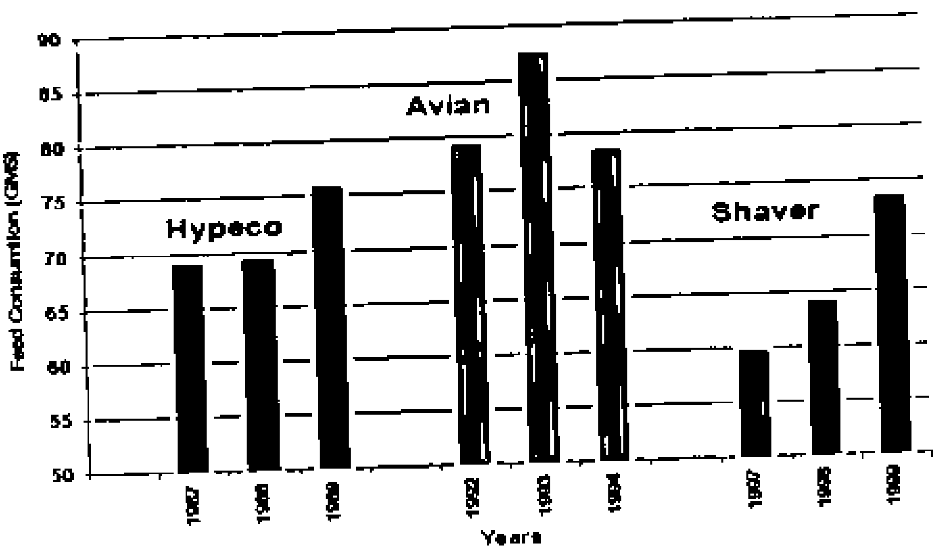
Mortality at any stage also includes culled birds.

Means having uncommon superscripts differ significantly ($P<0.05$).

There were significant differences (P<0.001) in daily feed consumption between breeds birds sex segments (Table.4). The lowest daily feed consumption was recorded by female lines females (D segments), but the highest was recorded by male lines males (A segments).

There were significant differences (P<0.001) in daily between breeding years. (Figure.3) shows the relationship between the different years and daily feed consumption for different breeds.

Figure.3 The relationship between daily feed consumption and years for differents breeds (GP Rear. Period).



The highest daily feed consumption was observed during the year 1993 (Avian), but the lowest was recorded during 1997 (Shaver).

b - Bird Cumulative Feed Consumption (KGS):

Table.2, (Appendix) shows the variance components for the factors studied in bird cumulative feed consumption. Differences between projects were very close to significant (P= 0.07) in bird cumulative feed consumption. There were significant (P<0.001) differences in bird cumulative feed consumption between breeds as shown in Table.3. The Shaver breed had the lowest (P<0.05) amount of bird cumulative feed consumption followed by Avian. However, the relationship between age (wks) and cumulative feed consumption is presented in (Figure.4).

Table .4 Mean and standard error of feed traits, live body weight, and mortality percentage for different breeds male and female lines sex segments (GP R. Period).

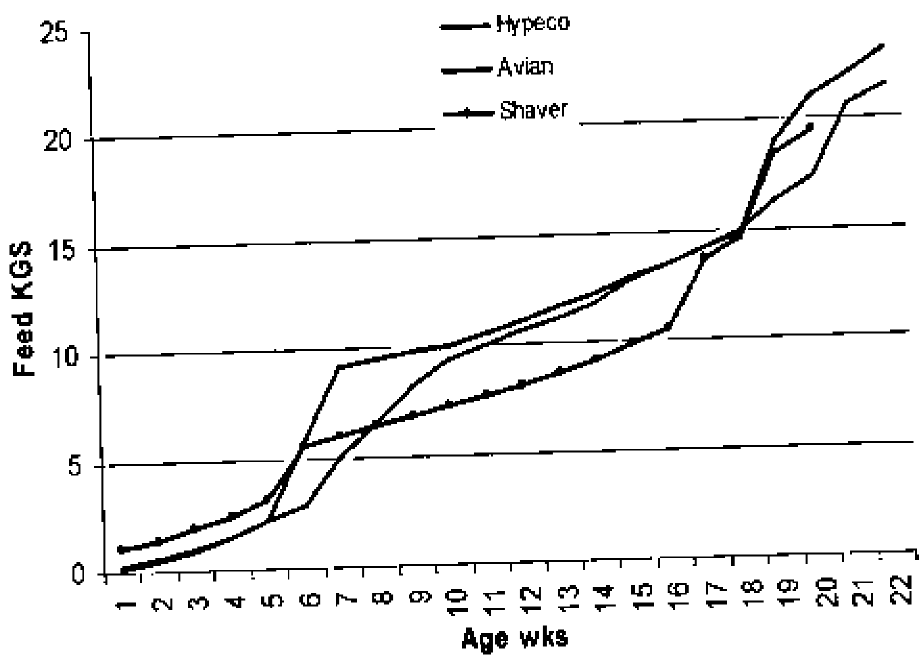
		N	Feed / Bird / Day GMS	Cum./Feed / Bird KGS	Feed-bird hous. KGS	Body Weight GMS	Mortality %
Line	Sex*		Mean ± S.E	Mean ± S.E	Mean ± S.E	Mean ± S.E	
Male	B	303	73.62 ± 1.505^{c}	7.353 ± 0.262^{c}	4.174 ± 0.115^{b}	1605 ± 36.179^{c}	6.852^{d}
	A	292	83.91 ± 3.776^{a}	17.743 ± 0.724^{a}	4.227 ± 0.210^{b}	2055 ± 49.498^{a}	11.435^{b}
Female	D	307	65.94 ± 1.175^{d}	5.035 ± 0.157^{d}	4.484 ± 0.134^{a}	1420 ± 30.748^{d}	8.097^{c}
	C	313	76.34 ± 1.447^{b}	9.772 ± 0.310^{b}	3.576 ± 0.091^{c}	1780 ± 41.035^{b}	13.898^{a}

• Sex segment (A = Male line Males, B = male line females, C = female line males, and D = female line females).

Mortality at any stage also include culled birds.

Means having uncommon superscripts differ significantly ($P<0.05$).

Figure.4 Relationship between bird-cumulative feed consumption and age for different breeds (GP Rearing Period).

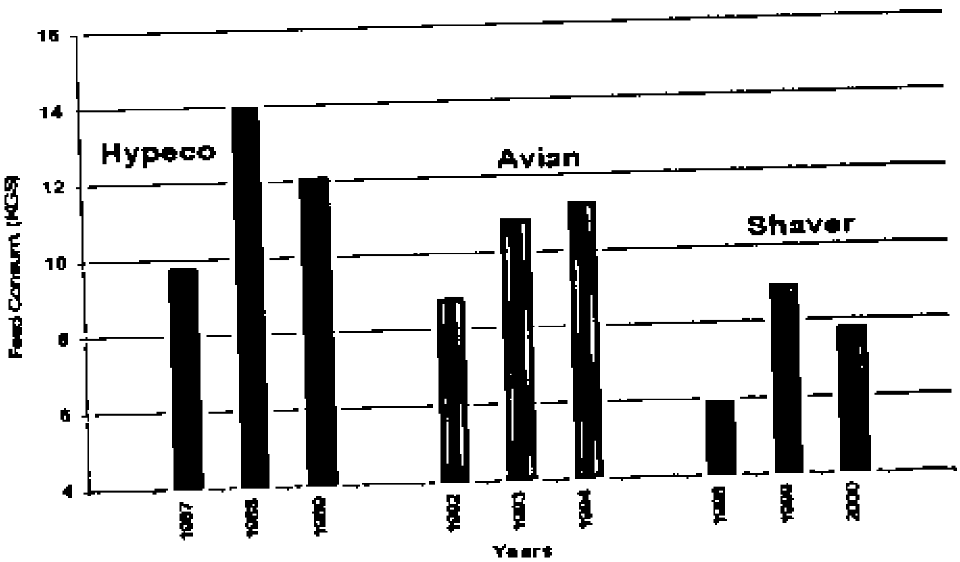


The flocks had significant (p<0.0001) effect on bird cumulative feed consumption. In addition, there were significant differences (p<0.001) between male and female lines in bird cumulative feed consumption.

There were significant differences (P<0.001) in bird cumulative feed consumption between sex segments for overall breeds (Table.4). The lowest bird cumulative feed consumption was recorded by female lines (D segments), but the highest was recorded by male lines (A segments).

There were no significant differences (p=0.240) in bird cumulative feed consumption between different months of the year. Whereas, significant differences (P<0.0001) in bird cumulative feed consumption between breeding years where observed. Figure.5 shows the relationship between the different years and cumulative feed consumption for different breeds. The highest cumulative feed consumption was observed for Hypeco breed, but the lowest was recorded by Shaver breed.

Figure.6 The relationship between bird-cumulative feed consumption and years for different breeds (GP Rear. Period).



c - Bird-housed Feed Consumption (KGS):

The variance components of bird housed feed consumption are shown in Table.3 (Appendix). Differences between projects were not significant (P=0.972) in bird housed feed consumption. There were significant (P<0.001) differences in bird housed feed consumption between breeds (Table.3). The Hypeco breed had the lowest (P<0.05) amount of bird housed feed consumption followed by Shaver.

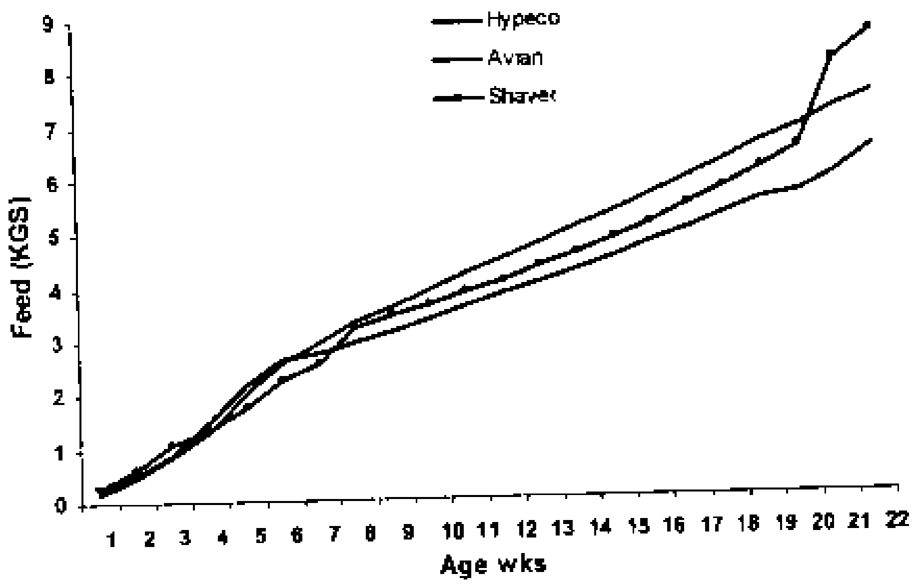
The relationship between age (wks) and bird housed feed consumption is presented in (Figure.6).

The flocks had significant (p<0.0001) effect on bird housed feed consumption. However, there were no significant differences (p>0.05) between male and female lines in bird housed feed consumption.

There were significant differences (P<0.001) in bird housed feed consumption between birds sex segments for the breeds (Table.4).

The lowest bird housed feed consumption was recorded by female lines males (C segments), but the highest was recorded by female lines females (D segments). On the other hand, there were no differences (P>0.05) between male lines sex segments.

Figure.6 The relationship between bird-housed feed consumption and age for different breeds (GP Rearing Period).



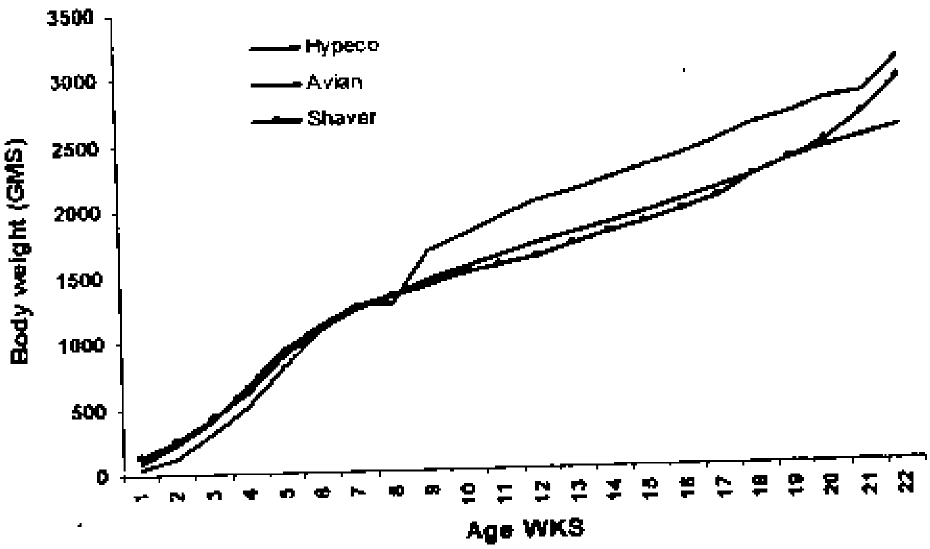
There were no significant differences (p=0.089) in bird housed feed consumption between different months of the year. Also, there were no significant differences (P=0.456) in bird housed feed consumption between breeding years.

1.1.2. Body Weight

The variance components of live body weight are shown in Table.4 (Appendix). However, there were no significant differences (P>0.05) between projects in live body weight. But There were significant (P<0.001) differences in live body weight between breeds (Table.3).The Shaver breed had the lowest (P<0.05) live body weight mean followed by Hypeco breed. The relationship between age and live body weight is presented in (Figure.7).

The flocks had a significant (p<0.0001) effect on live body weight. However, there were significant differences (p<0.001) in live body weight between male and female lines. In male lines, live body weight mean was (1828 ± 31.832), but in Female lines it was (1602 ± 26.689).

Figure.7 The relationship between live body weight and age for different breeds (G-P-Rearing).



There were significant differences (P<0.001) in live body weight between birds sex segments for all breeds (Table.4). The lowest live body weight was recorded by female lines females (D segments), but the highest was recorded by male lines males (A segments).

There were significant differences (p<0.0001) in live body weight between different months of the year.

Figure.8 The relationship between live body weight and months for different breeds (GP Rearing period).

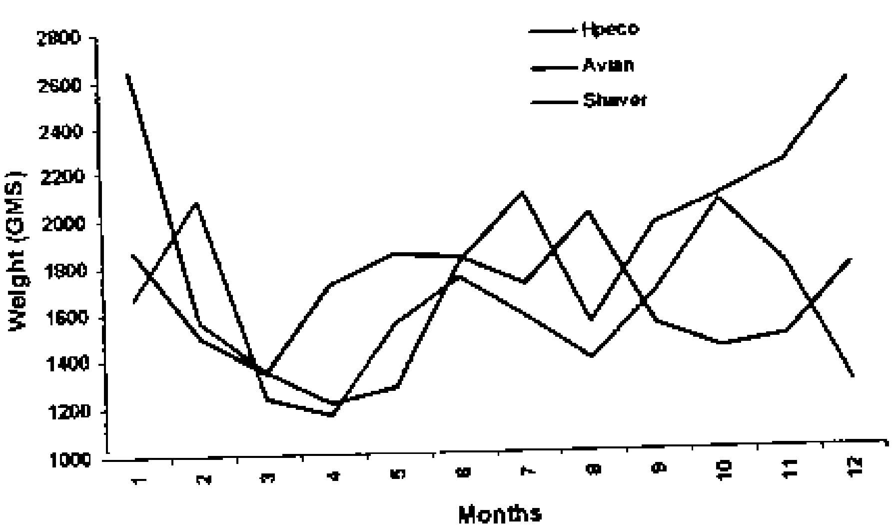


Figure.8 shows the relationship between the different months and live body weight for all breeds. The lowest live body weight was observed during April for Shaver and Avian breed, but for Hypeco breed the lowest body weight mean was recorded during March. Moreover, the highest body weight was recorded during January.

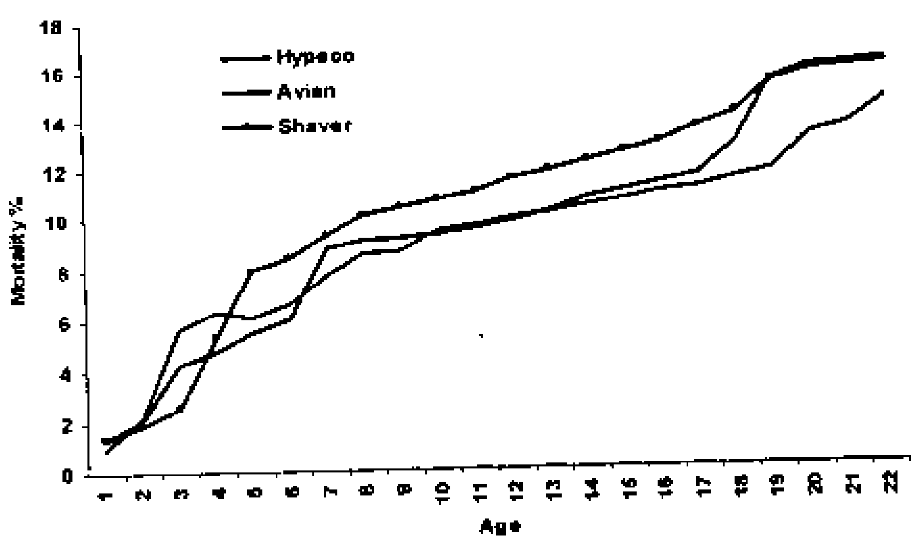
There were no significant differences (p>0.05) in live body weight between different years.

1.1.3. Cumulative Mortality Percent:

The variance components of cumulative mortality percent are shown in Table.5 (Appendix). However, there were significant differences (P<0.0001) between projects in cumulative mortality. Over all mean of cumulative mortality means were 13.80 % and 7.762 % for Gut El-sultan and Tawargha projects respectively.

There were significant (P<0.0001) differences in cumulative mortality between breeds (Table.3). The lowest cumulative mortality was recorded by Avian breed, but the highest was recorded by Shaver breed. However, the relationship between age (wks) and cumulative mortality for all breeds is presented in (Figure.9).

Figure.9 The relationship between mortality percentage and age for different breeds (GP Rearing Period).



The flocks had significant (p<0.0001) effect on cumulative mortality. However, There were significant differences (p<0.05) in cumulative mortality between male and female lines. In male lines cumulative mortality mean was 9.10 %, but in Female lines it was 11.02 %. There were significant differences (P<0.001) in cumulative mortality between sex segments (Table.4). The lowest cumulative mortality was recorded by male lines females (B segments), but the highest was recorded by female lines males (C segments).

There were no significant differences (p>0.05) in cumulative mortality between different months and years.

1.2. Production period

1.2.1. Feed Traits

a. Bird daily feed consumption (GMS):

Table.6 (Appendix) shows variance components of daily feed consumption. However, there were significant differences (P<0.0001) in bird daily feed consumption between projects. In Ghout El-sultan, the daily feed consumption was high (161.06 ± 0.766) compared with Tawargha project (155.58 ± 0.585).

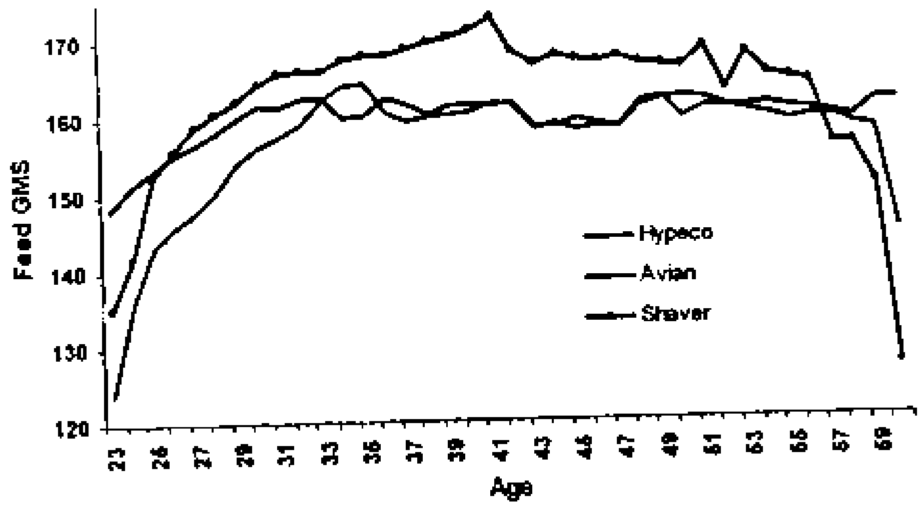
There were significant (P<0.001) differences in bird daily feed intake between the breeds (Table.5).The Avian breed had the lowest (P<0.05) amount of feed consumption, whereas, the highest was recorded by Shaver breed. However, the relationship between age and daily feed consumption for different breeds is presented in (Figure.10). Daily feed consumption for Avian and Shaver breeds was low during the first weeks of production period. After that Shaver breed had the highest daily feed consumption, but Avian had nearly same rate of daily feed consumption with the Hypeco breed especially after 33 weeks of age.

Table .5 Mean and standard error of feed traits and egg traits for different breeds (GP Prod. Period).

Breed	N	Feed / Bird/Day GMS	Feed/ Hen housed KGS	Hen housed egg prod. EGGS	Hen hous. hatching egg EGGS
		Mean ± S.E	Mean ± S.E	Mean ± S.E	Mean ± S.E
Hypeco	438	157.179 ± 0.962 [b]	22.996 ± 0.581 [b]	68.604 ± 2.056 [a]	54.934 ± 1.686 [a]
Avian	448	155.948 ± 0.733 [c]	22.957 ± 0.602 [b]	66.360 ± 2.002 [b]	53.999 ± 1.664 [b]
Shaver	437	161.835 ± 0.800 [a]	24.357 ± 0.609 [a]	65.288 ± 2.042 [c]	51.620 ± 1.698 [c]

Means having uncommon superscripts differ significantly ($P<0.05$).

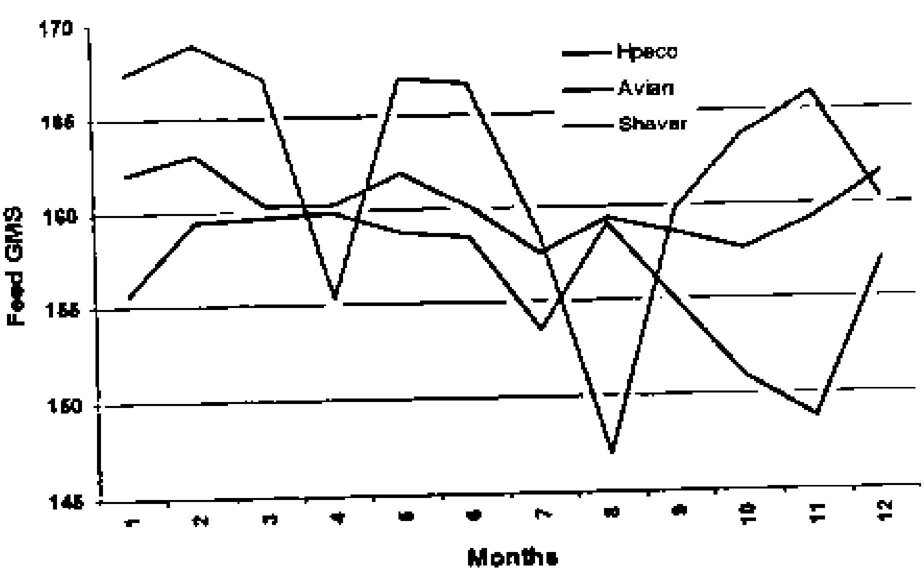
Figure.10 The relationship between daily feed consumption and age for different breeds (GP Prod Period).



There were a significant differences ($p<0.0001$) in daily feed consumption between flocks and lines. Daily feed consumption was (160 ± 0.692) and (157 ± 0.683) for male and female lines respectively.

There were significant ($p<0.01$) differences in daily feed consumption between different months of the year. Figure.11 explains the relationship between birds daily feed consumption over different months of the year.

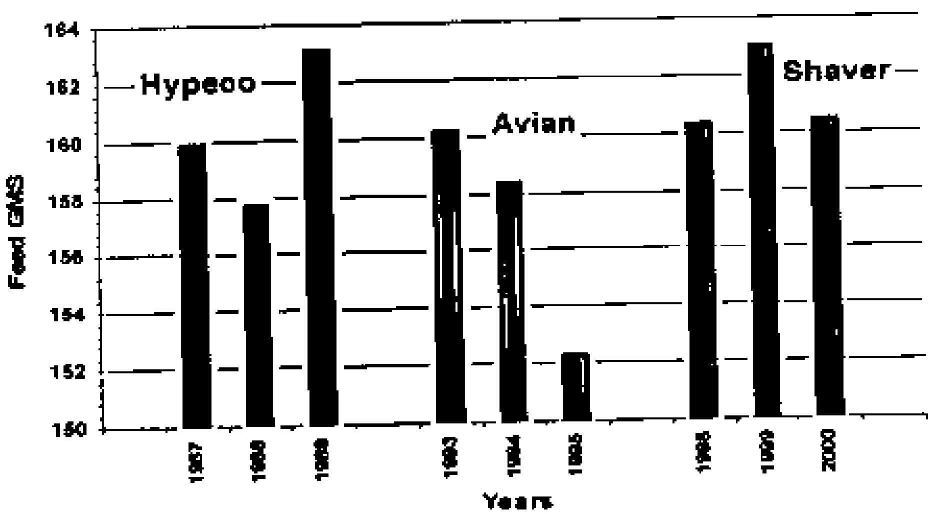
Figure.11 The relationship between daily feed consumption and months for different breeds (GP Prod. Period)



The lowest amount was observed during July, August and November for the Hypeco, Shaver, and Avian breeds respectively. The highest amount of daily feed consumption was observed during February for Shaver and Hypeco, whereas, the highest consumption for Avian was observed during February, March, and April with nearly the same rate.

There were significant differences (P<0.0001) in daily feed consumption between breeding years. (Figure.12) shows the relationship between the different years and daily feed consumption for all breeds. The lowest daily feed consumption was observed during the years 1995 and 1988 (Avian and Hypeco). But the highest was observed during 1989 and 1999 (Hypeco and Shaver).

Figure.12 The relationship between bird-daily feed consumption and years for different breeds (GP Prod. period)

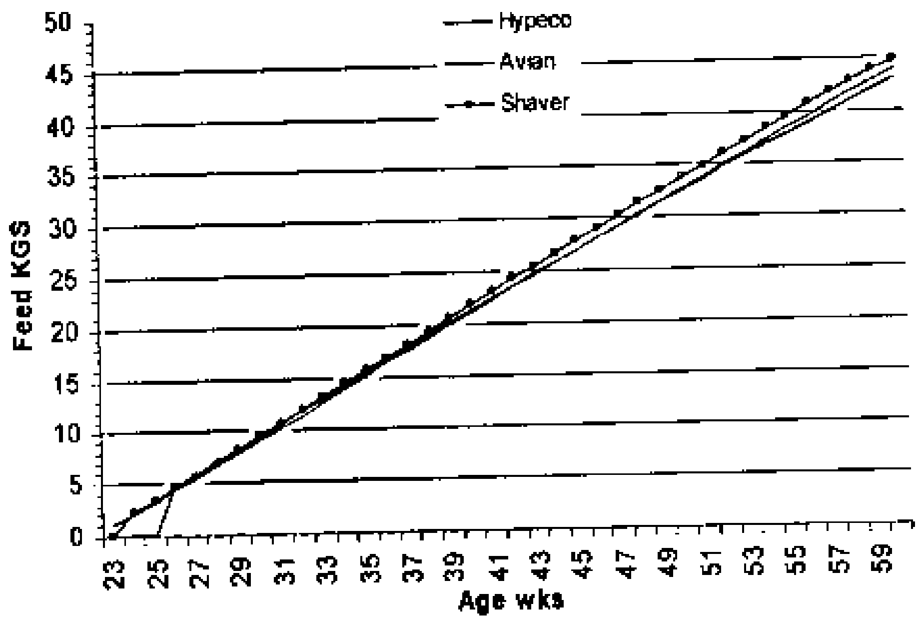


b. Hen-housed feed consumption (KGS):

Table.7 (Appendix) illustrates variance components of hen-housed feed consumption. However, there were no significant differences (P>0.05) in hen-housed feed consumption between projects.

There were significant (P<0.0001) differences in hen-housed feed consumption between the breeds (Table.5). The Avian breed had the lowest (P<0.05) amount of hen-housed feed consumption, whereas, the highest was recorded by Shaver breed. However, the relationship between age and hen-housed feed consumption is presented in (Figure.13).

Figure.13 The relationship between hen-housed feed consumption and age for different breeds (GP Prod. Period).



There were significant differences ($p<0.0001$) in hen-housed feed consumption between flocks and lines. Hen-housed feed consumption was (23.539 ± 0.489), (23.326 ± 0.487) for male and female lines respectively. There were significant differences ($p<0.001$) in hen-housed feed consumption between different months of the year. Figure.14 shows the relationship between hen-housed feed consumption over different months of the year. The lowest amount was observed during August, September, and November for the Hypeco, Shaver, and Avian breeds respectively. The highest rate of bird-housed feed consumption was observed during February for Hypeco, whereas, the highest consumption for Avian and Shaver was observed during July. There were significant differences ($P<0.0001$) in hen-housed feed consumption between breeding years. Figure.15 shows the relationship between the different years and hen-housed feed consumption for all breeds. The lowest hen-housed feed consumption was observed during the year 1998 (Shaver), but the highest was observed during 1995 (for Avian breed).

Figure .14 The relationship between hen-housed feed consumption and months for different breed (GP Prod Period).

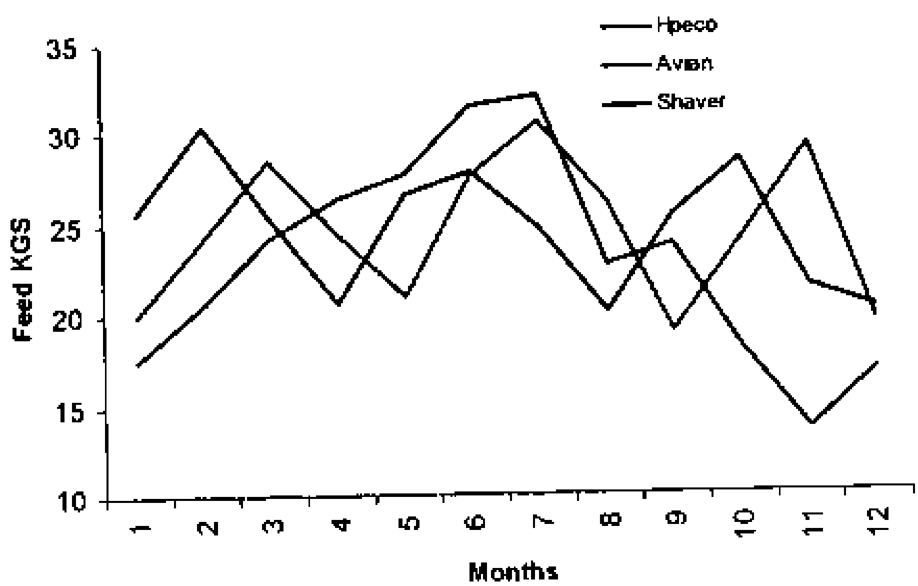
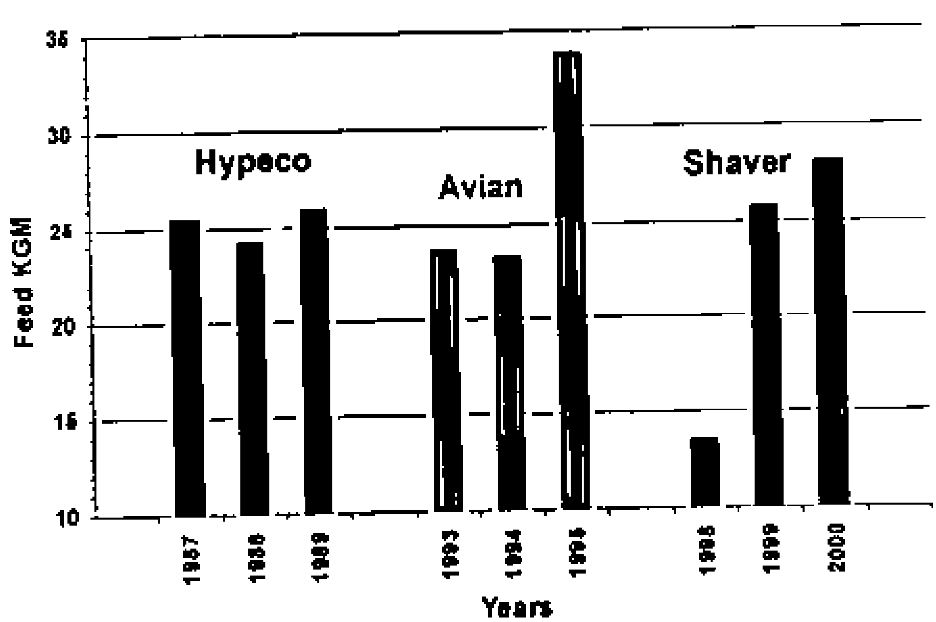


Figure.15 The relationship between hen-hous. feed consumptionor and yearas for different breeds (GP Prod. Period)

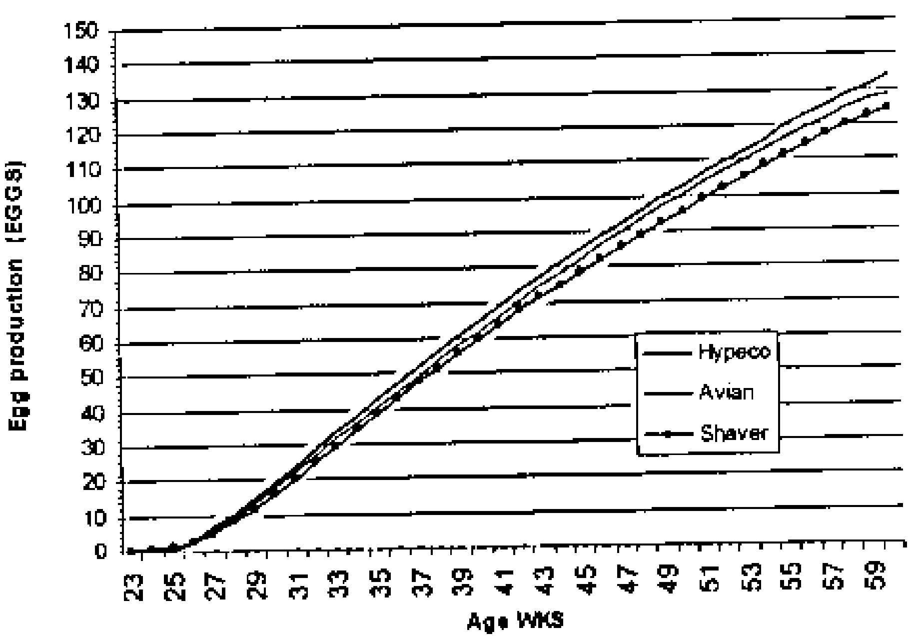


1.2.2. Egg Traits

a. Hen-housed egg production (Eggs):

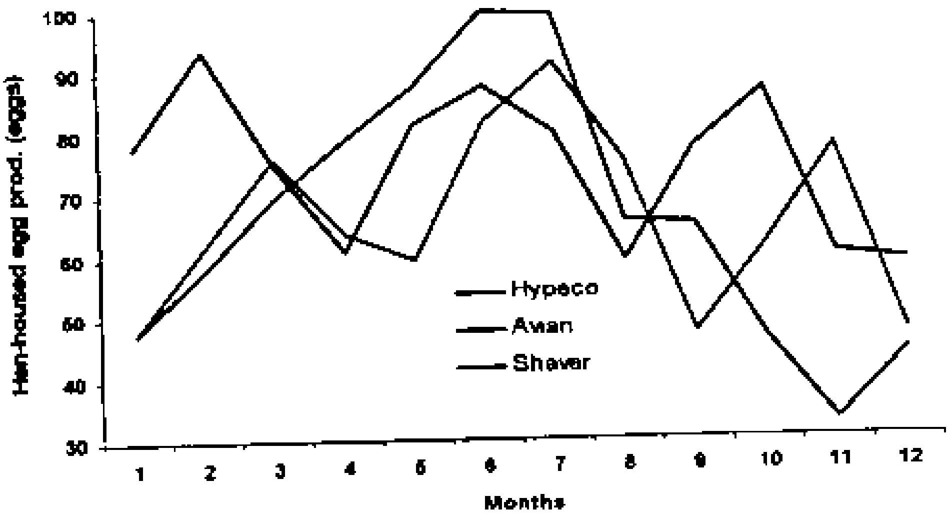
Table.8 (Appendix) shows variance components of hen-housed egg production. However, there were no significant differences (P>0.05) in hen-housed egg production between projects. There were significant (P<0.001) differences in hen-housed egg production between the breeds (Table.5). The Hypeco breed had the highest (P<0.05) amount of hen-housed egg production, whereas, the lowest was recorded by Shaver breed. However, the relationship between age and hen-housed egg production is presented in (Figure.16).

Figure.16 The relationship between hen-housed egg production and age for different breeds (G-P-Prod. Period)



There were significant differences (p<0.0001) in hen-housed egg production between flocks and lines. Hen-housed egg production was (60.444 ± 1.474), (73.006 ± 1.793) for male and female lines respectively. There were significant (p<0.0001) in hen-housed egg production between different months of the year. Figure.17 shows the relationship between hen-housed egg production over the different months of the year.

Figure. 17 The relationship Hen-housed egg production and months for different breeds (GP Prod. Period).



The lowest hen-housed egg production was observed during November by Avian breed. Also, the highest hen-housed egg production obtained by the same breed in June and July. In general, the highest hen-housed egg production was observed during the months January, June, and July. There were significant differences ($P<0.0001$) in hen-housed egg production between breeding years.

Figure.18 The relationship between hen-housed egg production and years for different breeds breeds (G-P- Prod. Period)

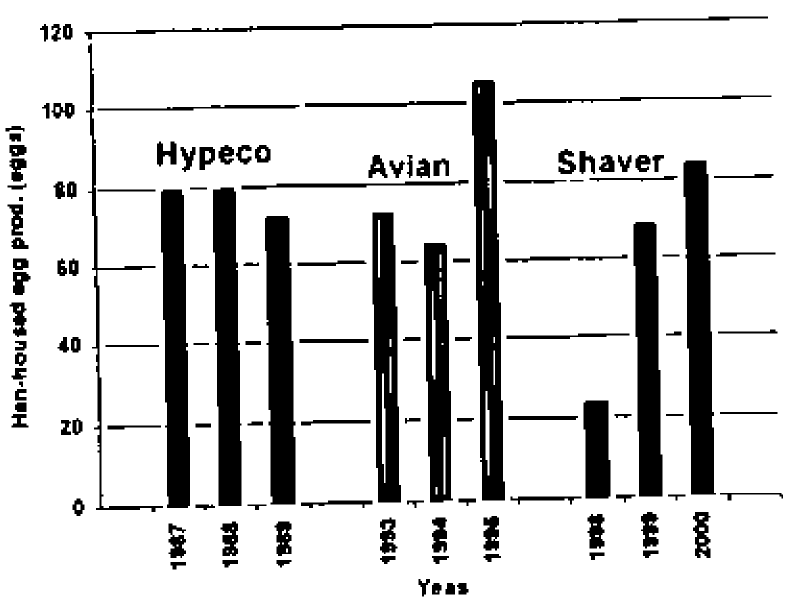


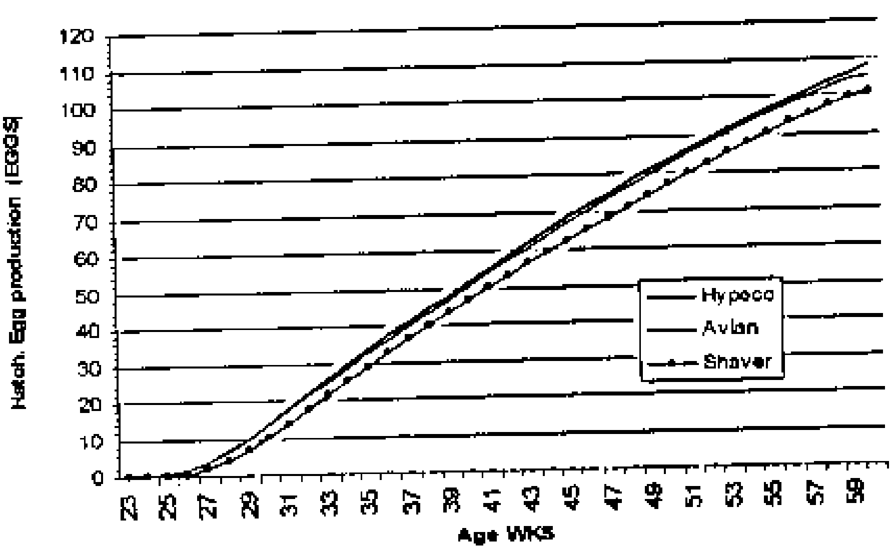
Figure.18 shows the relationship between the different years and hen-housed egg production for all breeds. The lowest hen-housed egg production was recorded by the Shaver breed (1998), but the highest was observed during 1996 (Avian breed).

b. Hen-housed hatching egg production (Eggs):

Table.9 (Appendix) shows variance components of hen-housed hatching egg production. However, there were no significant differences ($P>0.05$) in hen-housed hatching egg production between projects.

There were significant ($P<0.001$) differences in hen-housed hatching egg production between the breeds (Table.5). The Hypeco breed had the highest ($P<0.05$) amount of hen-housed hatching egg production, whereas, the lowest was recorded by Shaver breed. However, the relationship between age (wks) and hen-housed hatching egg production is presented in (Figure.19).

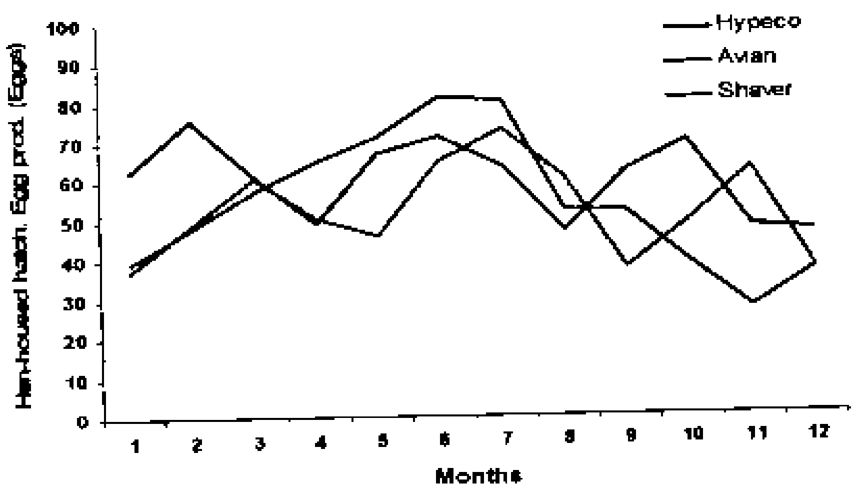
Figure.19 The relationship between hen-housed hatching egg production and age for different breeds (G-P-Prod. Period)



There were significant differences ($p<0.0001$) in hen-housed hatching egg production between flocks and lines. Hen-housed hatching egg production were (48.139 ± 1.210), (58.866 ± 1.490) for male and female lines respectively.

There were significant (p<0.0001) differences in hen-housed hatching egg production over different months of the year. Figure.20 shows the relationship between hen-housed hatching egg production and different months of the year. The lowest hen-housed hatching egg production was observed during November by Avian breed. Also, the highest hen-housed hatching egg production was obtained by the same breed June and July.

Figure.20 The relationship between hen-hous. hatch egg production and months for different breeds (GP Prod. Period).



There were significant differences (P<0.0001) in hen-housed hatching egg production between breeding years.

Figure 21 The relationship between hen-housed hatch. egg production and years for different breeds breeds (GP Prod. Period)

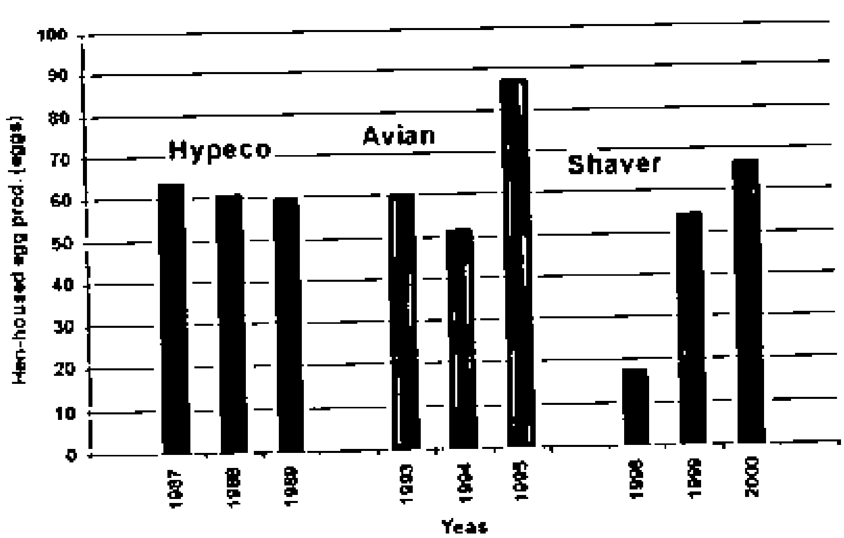
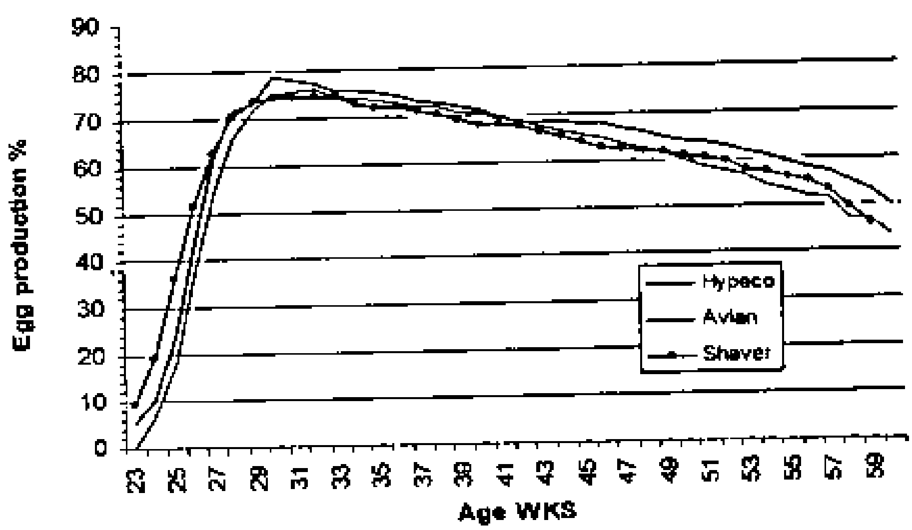


Figure.21 shows the relationship between the different years and hen-housed hatching egg production for all breeds. The lowest hen-housed egg production was observed during the year 1998 (Shaver), but the highest was observed during 1995 (Avian).

c. Daily egg production (%):

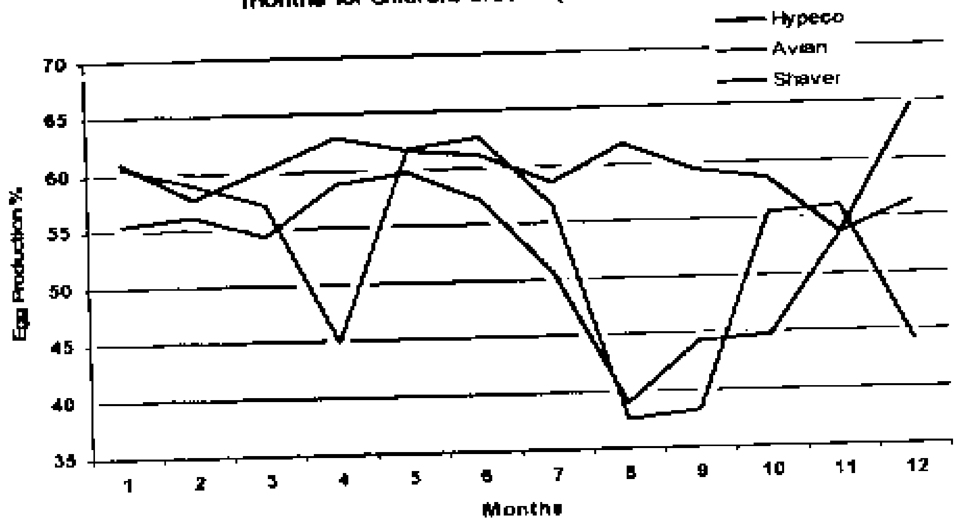
Table.10 (Appendix) shows variance components of factors affecting hen-daily egg production. However, there were no significant differences (P>0.05) in hen-daily egg production between projects. There were significant (P<0.0001) differences in hen-daily egg production between the breeds (Table.6). The Hypeco breed had the highest (P<0.05) daily egg production, whereas, the lowest was recorded by Shaver breed. The relationship between age and daily egg production is presented in (Figure.22).

Figure.22 The relationship between hen-daily egg production and age for different breeds (GP Prod. Period)



Shaver breed had a high rate of daily egg production during first weeks of production period, then after the week 29 Hypeco breed had the highest rate. There were significant differences (p<0.0001) in daily egg production over different months of the year. Figure.23 shows the relationship between daily egg production and different months of the year. The lowest daily egg production was observed during August and September by Avian and Shaver breeds, whereas, Hypeco breed was recorded lowest daily egg production during November. Also, the highest daily egg production was observed during May and June for Avian and Shaver breeds respectively, whereas, Hypeco breed recorded highest daily egg production during December.

Figure.23 The relationship between hen-daily egg productio and months for different breeds (GP Prod. Period).



There were significant differences ($P<0.0001$) in daily egg production between breeding years. Figure.24 shows the relationship between the different years and daily egg production for all breeds.

Figure 24 The relationship between hen-daily egg production and years for different breeds (G-P- Prod. Period)

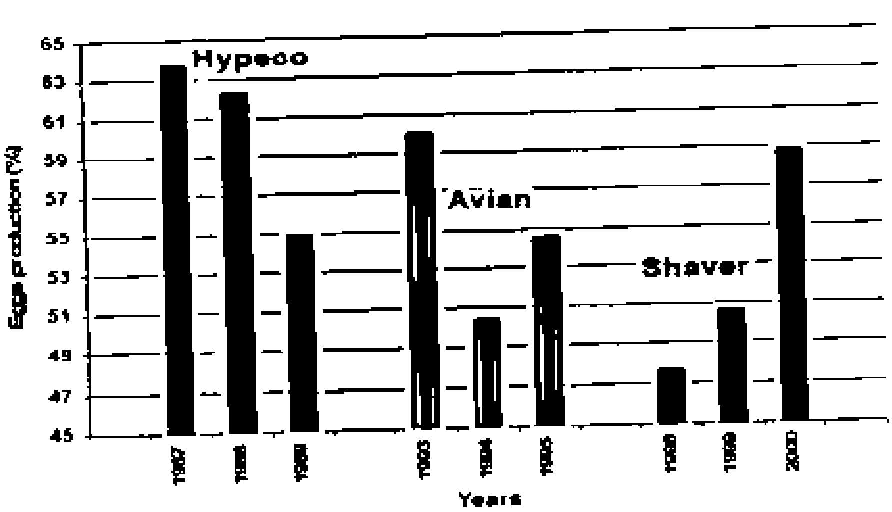


Table .6. Egg traits and mortality percentage mean for different breeds (GP Prod. Period).

Breed	d.f	Hen-daily egg production. %	Hen daily hatch. Egg %	Mortality %
Hypeco	438	56.074^{a}	50.799^{a}	8.470^{a}
Avian	448	53.073^{b}	49.726^{b}	6.574^{c}
Shaver	437	52.588^{c}	48.543^{c}	7.039^{b}

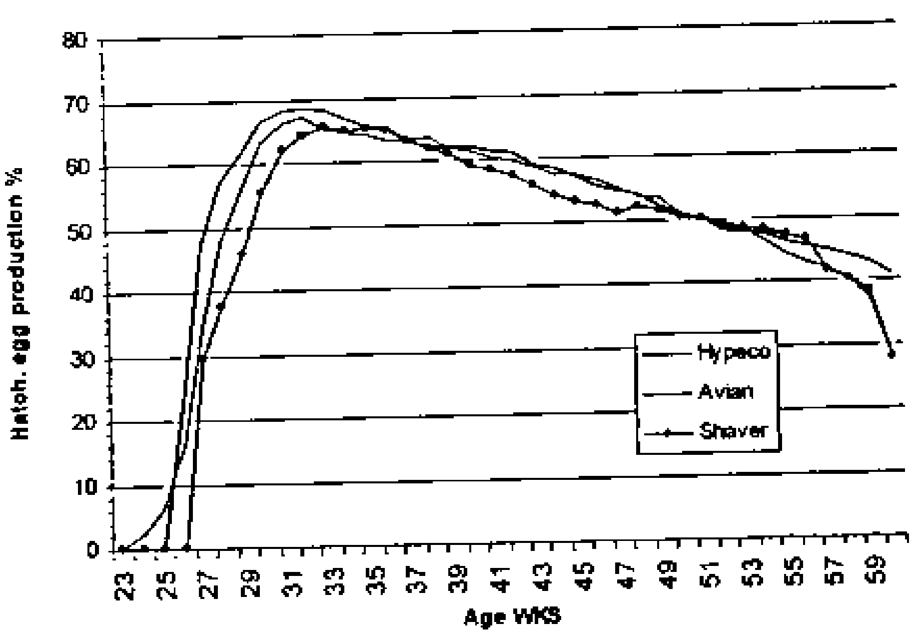
Means having uncommon superscripts differ significantly ($P<0.05$).

d. Hen-daily hatching egg production (%):

Table.11 (Appendix) shows variance components of hen-daily hatching egg production. However, there were no significant differences (P>0.05) in daily hatching egg production between projects.

There were significant (P<0.0001) differences in daily hatching egg production between the breeds (Table.6).The Hypeco breed had the highest (P<0.05) hen-daily hatching egg production, whereas, the lowest was recorded by Shaver breed.

Figure.25 The relationship between hen-daily hatching egg production and age for different breeds (GP Prod. Period)

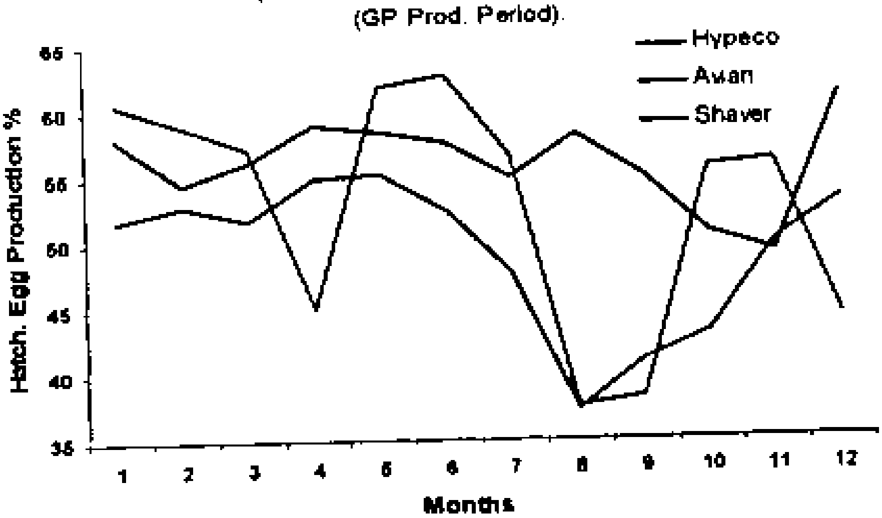


However, the relationship between age and daily hatching egg production is presented in (Figure.25).

There were significant differences (p<0.0001) in hen-daily hatching egg production between flocks and lines. Daily hatching egg production was (45.406 ± 0.715), (53.943 ± 0.792) for male and female lines respectively.

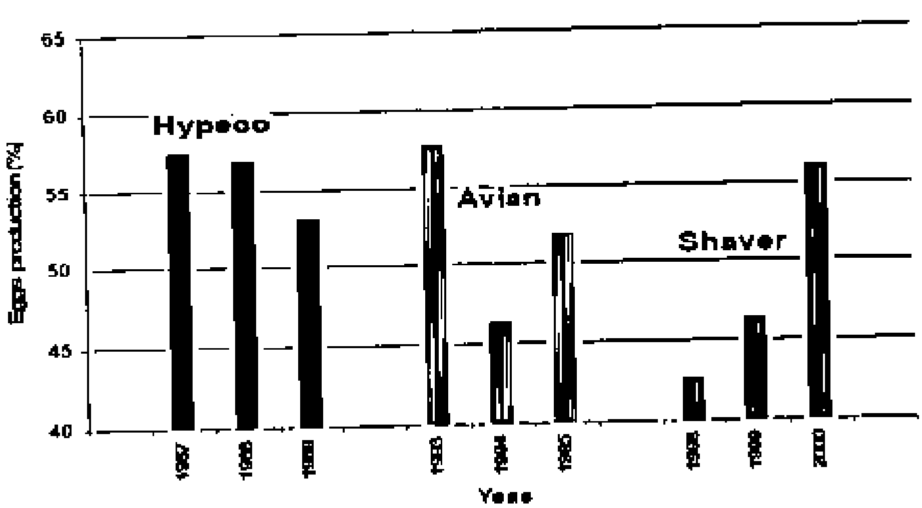
There were significant (p<0.0001) in daily hatching egg production over different months of the year. Figure.26 shows the relationship between daily hatching egg production over different months of the year.

Figure.26 The relasionship between hen-daily Hatching egg production and months for different breeds (GP Prod. Period).



The lowest daily hatching egg production was observed during August and September by Avian and Shaver breeds, whereas, Hypeco breed was recorded the lowest daily hatching egg production during November. Also, the highest daily hatching egg production was observed during April and May for Avian, May and June for Shaver, and during December for Hypeco. There were significant differences (P<0.0001) in daily hatching egg production between breeding years. Figure.27 shows the relationship between the different years and daily hatching egg production for all breeds.

Figure.27 The relationship between hen-daily hatch. egg production and years for different breeds (GP Prod. Period).



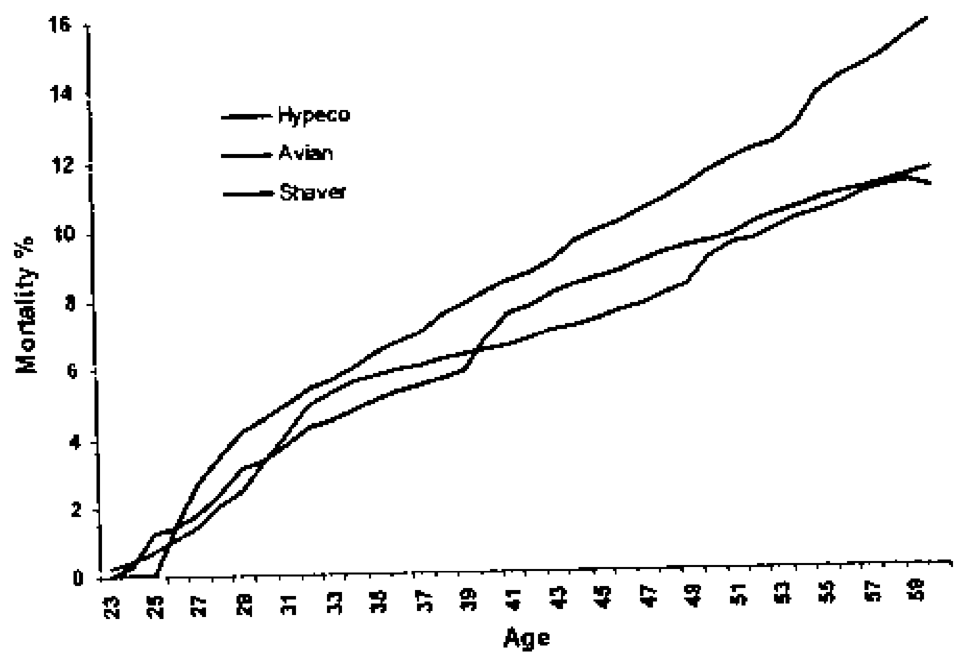
The lowest hen daily hatching egg production was observed during the years 1998 for Shaver breed, but the highest was recorded by Avian breed during the year 1993.

1.2.3. Cumulative mortality Percent:

Table.12 (Appendix) shows variance components of cumulative mortality percent. However, there were no significant differences ($P>0.05$) in cumulative mortality between projects.

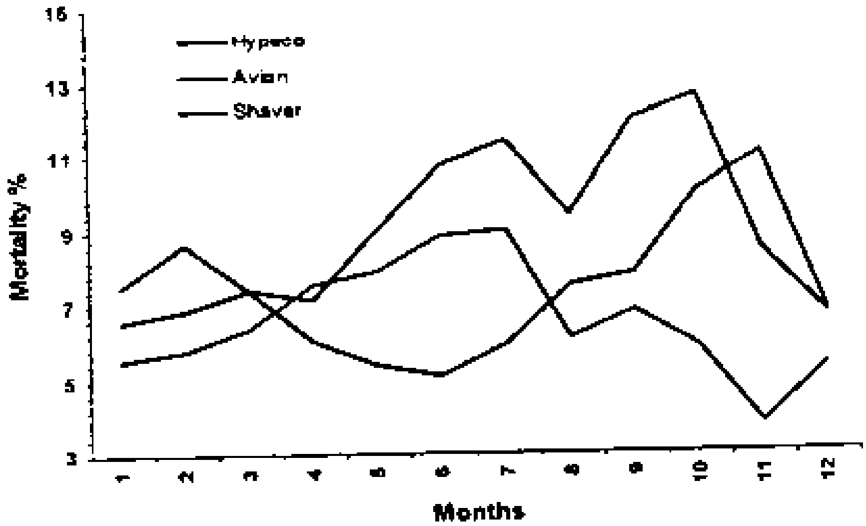
There were significant ($P<0.0001$) differences in cumulative mortality between the breeds (Table.6). The Hypeco breed had the highest ($P<0.05$) cumulative mortality, whereas, the lowest was recorded by Avian breed. The relationship between age and cumulative mortality is presented in (Figure.28). There were significant differences ($p<0.0001$) in cumulative mortality between flocks and lines. Cumulative mortality were 8.64% and 6.07 % for male and female lines respectively.

Figure.28 The relationship between mortality percent and age for different breeds (GP Prod. Period).



There were significant ($p<0.0001$) differences in cumulative mortality between different months of the year. Figure.29 shows the relationship between cumulative mortality and different months of the year.

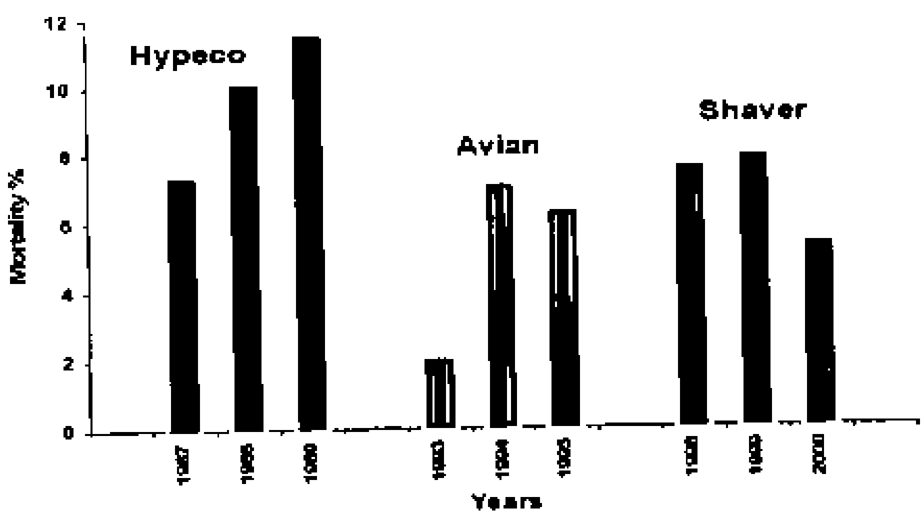
Figure .29 The relationship between mortality percent and month for different breeds (GP Prod. Period)



The lowest cumulative mortality was observed during December for Hypeco breed, during November for Avian, and during June for Shaver breed. Also, the highest cumulative mortality was observed during October, July, and November for Hypeco, Avian and Shaver breeds respectively.

There were significant differences ($P<0.0001$) in cumulative mortality between breeding years. Figure.30 shows the relationship between the different years and cumulative mortality for all breeds.

Figure .30 The relationship between cumulative mortality percent and years for different breeds (GP Prod. Period)



The highest cumulative mortality was observed during the years 1989 (for Hypeco breed) , but the lowest was recorded during by Avian breed during the year 1993.

2. Parent lines results:

2.1. Rearing period:

2.1.1. Feed Traits:

a- Bird daily feed consumption (GMS):

Table.13 (Appendix) shows variance components of bird daily feed consumption. However, differences between projects were not significant (P=0.252) for bird daily feed intake. There were significant (P<0.001) differences in bird daily feed intake between the breeds (Table.7). The Hypeco breed had the highest (P<0.05) amount of feed consumption followed by Shaver. However, the relationship between age and daily feed consumption is presented in (Figure 31).

Figure.31 The relationship between bird-daily feed consumption and age for different breeds (P. Rearing Period).

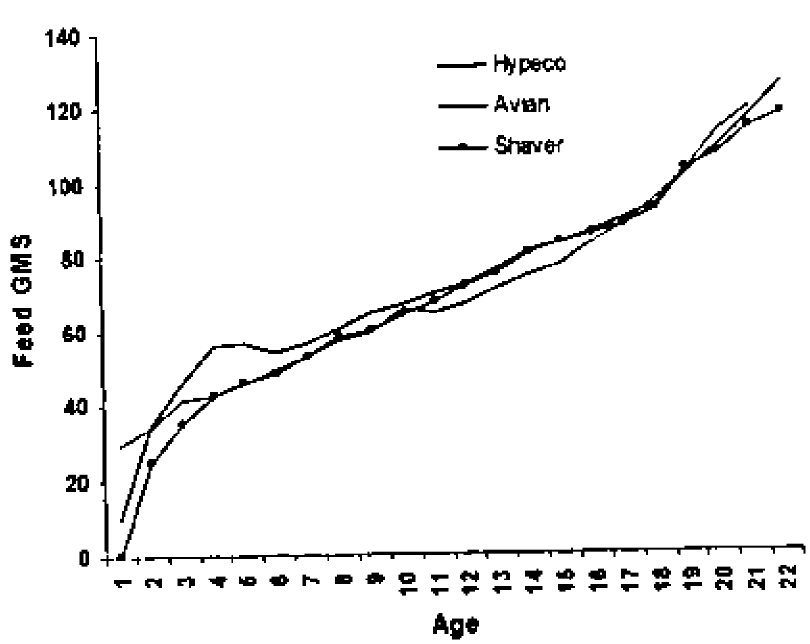


Table.7 Mean and standard error of feed traits, live body weight, and percentage of mortality for different breeds (P. Rearing Period).

Breed	N	Feed / Bird / Day GMS	Cum. Feed / Bird KGS	Feed-Bird Housed KGS	Weight GMS	Mortality %
		Mean ± S.E	Mean ± S.E	Mean ± S.E	Mean ± S.E	
Hypeco	1345	79.776 ± 0.766^{a}	6.378 ± 0.173^{b}	5.534 ± 0.151^{a}	1569 ± 19.887^{a}	8.932^{c}
Avian	1352	72.218 ± 0.750^{c}	5.543 ± 0.110^{c}	4.681 ± 0.079^{b}	1501 ± 18.755^{c}	9.433^{b}
Shaver	1384	$75.786 \pm .828^{b}$	6.605 ± 0.156^{a}	4.204 ± 0.063^{c}	1533 ± 20.979^{b}	13.758^{a}

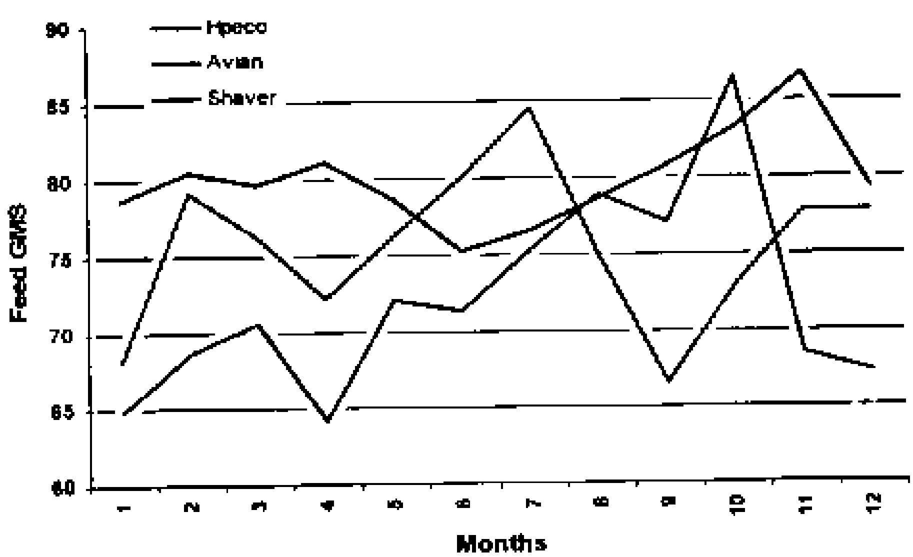
Mortality at any stage also include culled birds.

Means having uncommon superscripts differ significantly ($P<0.05$).

The overall parent and grand parent flocks had significant ($p<0.001$) effect on the bird-daily feed consumption. However, there were no significant ($p=0.315$) differences between flocks houses. There were significant differences ($P<0.001$) in daily feed consumption between genders. The means of daily feed consumption were (83.978 ± 0.637) and (67.902 ± 0.598) for males and females respectively.

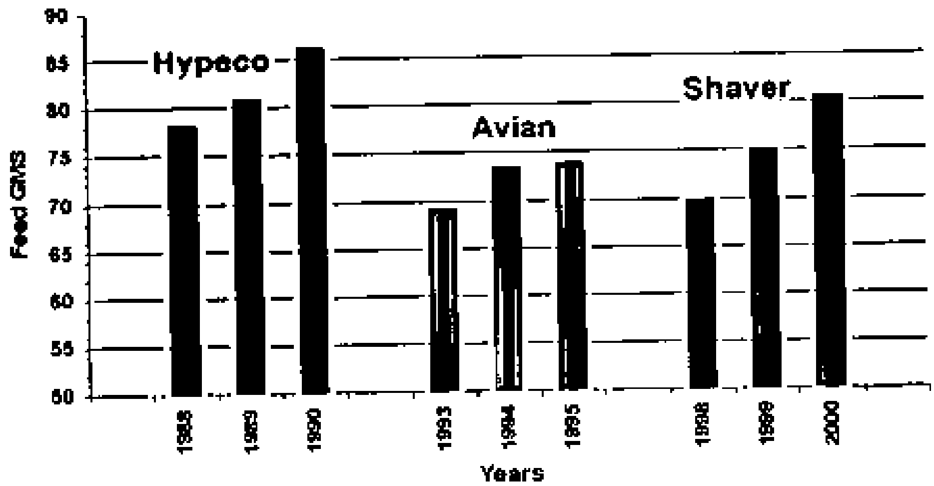
There were significant ($p<0.01$) differences in daily feed consumption between different months of the year. Figure.32 shows the relationship between daily feed consumption and different months of the year. The highest amount of daily feed consumption was observed during July, October, and November for Shaver, Avian, and Hypeco respectively. Whereas, the lowest amount was observed during September, April, and June for the same breeds respectively.

Figure.32 The relationship between dialy feed consumption and months for different breeds (P. Rearing. Period)



There were significant differences ($P<0.001$) in daily between breeding years. Figure.33 shows the relationship between the different years and daily feed consumption. The highest daily feed consumption was recorded by the Hypeco breed during the year 1990, but the lowest was observed in the year 1993 for Avian breed.

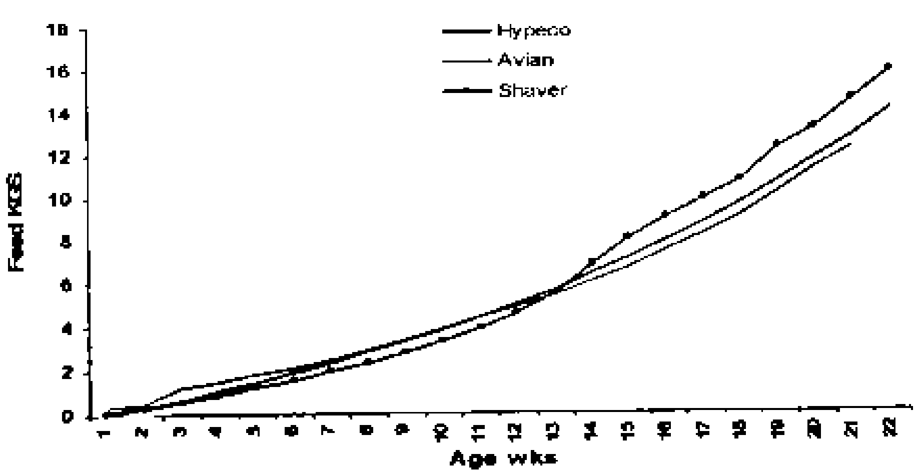
Figure.33 The relationship between years and daily feed consumption for different breeds (P. Rearing . Period)



b - Bird Cumulative Feed Consumption(KGS):

Table.14 (Appendix) shows variance components of the cumulative feed consumption. However, projects were very close to significant (p=0.07) in this trait. There were significant (p<0.001) differences in bird-cumulative feed consumption between breeds. The lowest amount of feed was used by Avian breed (5.543 ± 0.110), whereas, the highest amount was recorded by Shaver breed (6.605 ± 0.156) as shown in table.7. The relationship between cumulative feed consumption and breeds age is shown in (Figure.34).

Figure.34 The relationship between bird-cumulative feed consum. and age for different breeds (P. Rear. Period).

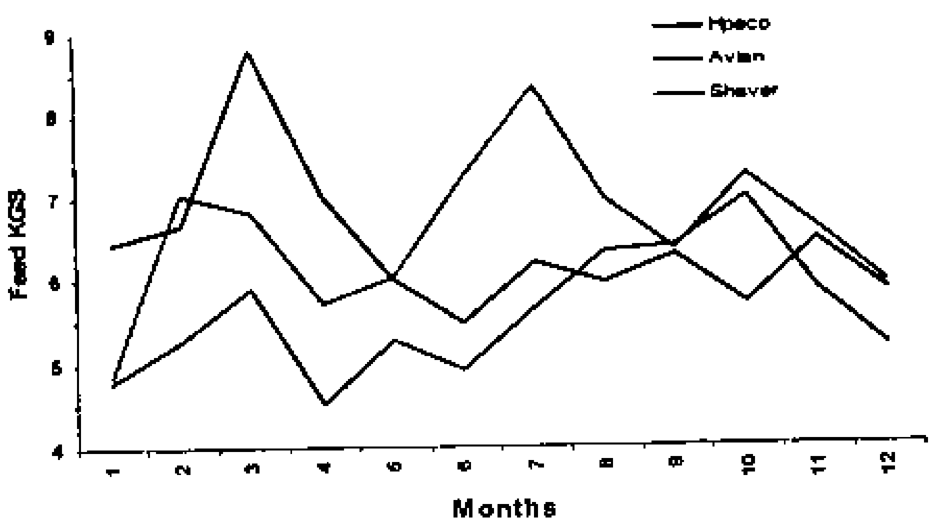


During the first half of the rearing period Shaver breed had the lowest rate of cumulative feed consumption, but during the second half it recorded a high amount of cumulative feed consumption. The Avian breed was recorded a height rate of cumulative feed consumption during first weeks of age, this rate was increased during later weeks of age. The Hypeco breed had middle cumulative feed consumption in comparing with Shaver and Avian breeds at all stages of age.

There were significant differences ($p<0.001$) in cumulative feed consumption between flocks. But there were no significant differences ($p=0.153$) in the same trait between the houses for all parent flocks. However, differences were observed between sexes ($P<0.001$) in cumulative feed consumption. The overall mean of cumulative feed consumption for all breeds was (7.436 ± 0.142), (4.928 ± 0.113) for males and females respectively.

There were significant differences ($P<0.001$) in bird-cumulative feed consumption between different months of the year. The relationship between the months and cumulative feed consumption for the different breeds are shown in (Figure.35).

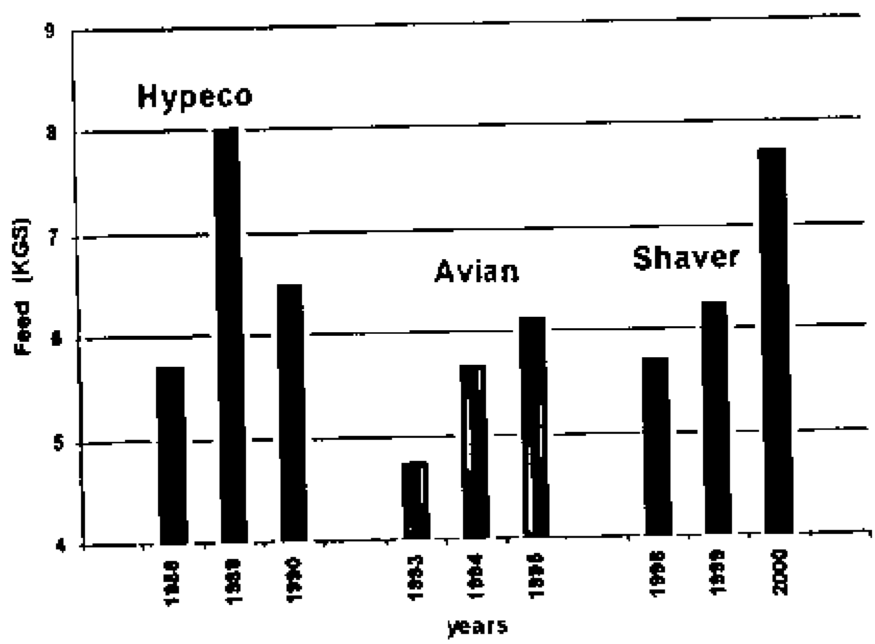
Fegure.35 The relationship between bird-cumulative Feed consum. and months for different breeds (P.Rear. Period).



The highest mean of cumulative feed consumption was recorded during March by Hypeco breed followed by Shaver breed during July, but the lowest means was observed during April and recorded by Avian breed.

There were significant differences ($p<0.01$) in cumulative feed consumption between breeding years. Figure.36 shows the relationship between different years and cumulative feed consumption for all breeds.

Figure.36 The relationship between bird-cumulative feed consum. and years for different breeds (P. Rearing Period).



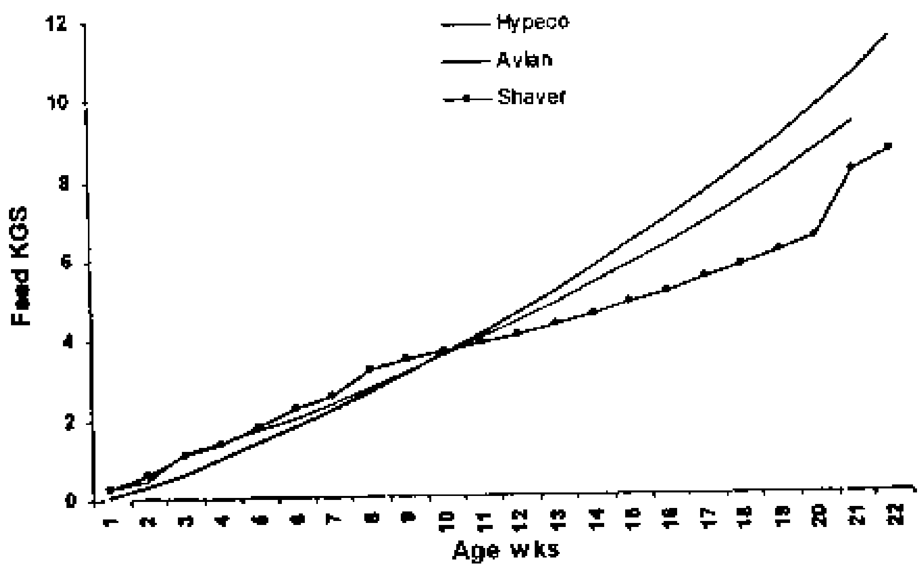
The highest amount of cumulative feed consumption was recorded by Hypeco breed during the year, but the lowest was recorded during the year 1993 for Avian breed.

C - Bird-housed Feed Consumption (KGS):

Table.15 (Appendix) shows the variance components of bird-housed feed consumption. However, there were no significant differences ($P= 0.101$) in bird-housed feed consumption between projects.

There were significant ($p<0.001$) differences in bird-housed feed consumption between the breeds. The lowest amount ($p<0.05$) of feed were used by Shaver breed (4.204 ± 0.063), whereas, the highest amount was recorded by Hypeco breed (5.534 ± 0.151) as shown in Table.7. However, the relationship between bird-housed feed consumption and breeds age are shown in (Figure.37). During the first ten weeks of the rearing period Shaver breed had the highest rate of bird-housed feed consumption followed by Avian breed, then later Shaver breed had the lowest rate followed by Avian breed.

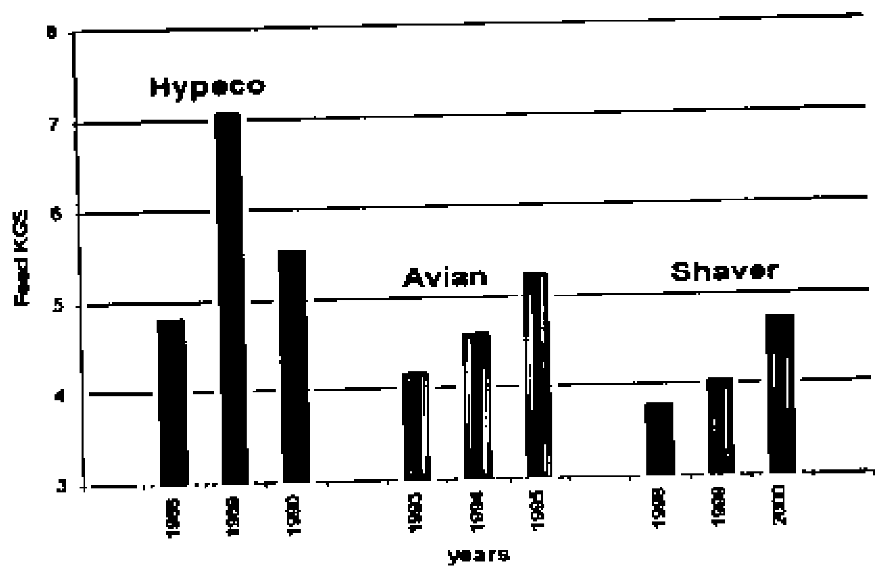
Figure.37 The relationship between bird-housed feed consumption and age for different breeds (P. Rearing Period.)



There were significant differences ($p<0.001$) in bird-housed feed consumption between flocks. But between houses There were no significant differences ($p=0.153$). However, the sex of the birds was differed significantly ($P<0.001$) in bird-housed feed consumption. The overall mean of bird-housed feed consumption for all breeds was (5.072 ± 0.064), (4.530 ± 0.103) for males and females respectively. There were no significant differences ($P>0.05$) in bird-housed feed consumption between different months of the year.

There were significant differences ($p<0.01$) in bird-housed feed consumption between breeding years. Figure.38 show the relationship between different years and bird-housed feed consumption for each breed.

Figure.38 The relationship between years and bird-housed feed consumption for different breeds (P. Rearing Period).



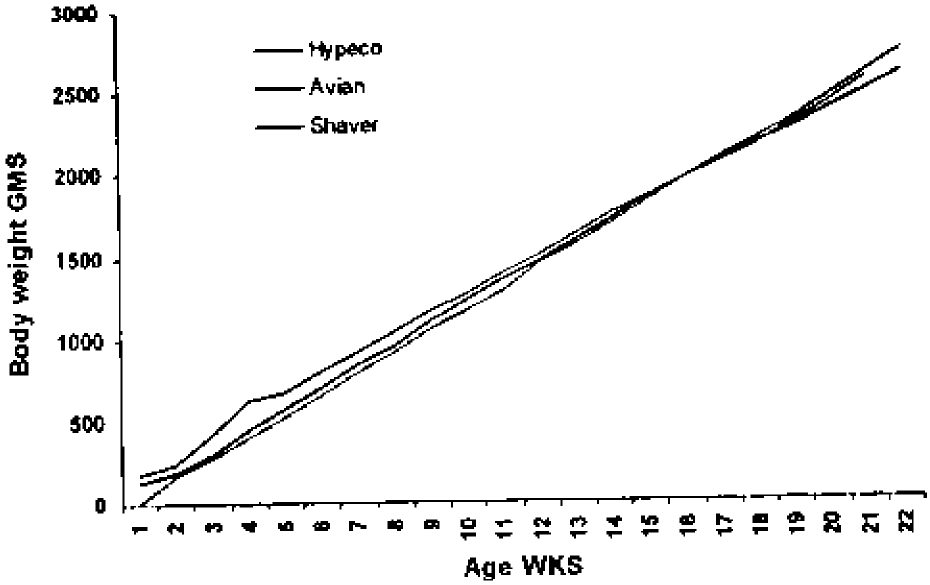
The highest amount of bird-housed feed consumption was observed during the year 1989 for Hypeco breed, but the lowest was recorded during the year 1998 by Shaver breed. In general, Hypeco breed had higher rate of bird-housed feed consumption in comparing whit the other breeds.

2.1.2. Live body Weight:

Table.16 (Appendix) shows the variance components of live body weight. There were significant differences ($P<0.001$) in body weight between projects (locations).

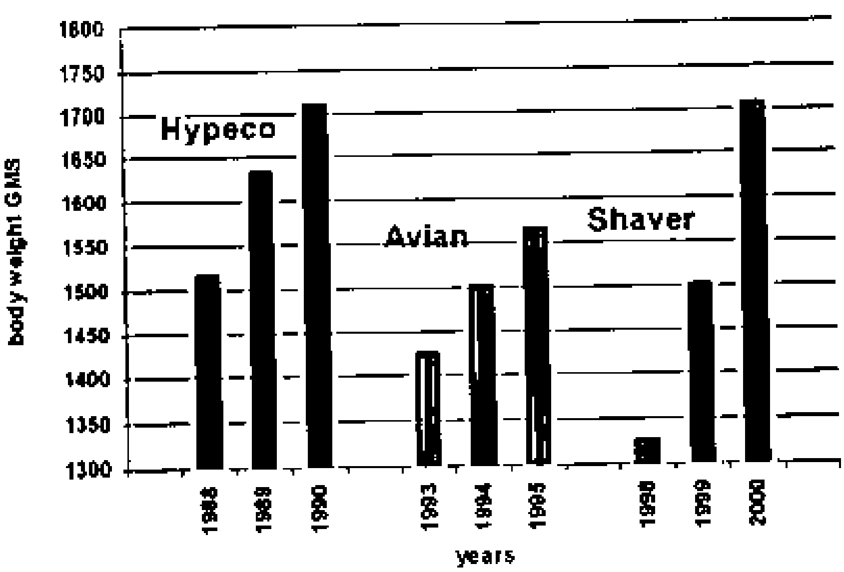
There were significant ($p<0.001$) differences in body weight between the breeds Table.7. The highest ($P<0.05$) body weight was obtained by Hypeco breed (1569 ± 19.887), whereas, the lowest was recorded by Avian breed (1501 ± 18.755). However, the relationship between body weight and breeds age is shown in Figure.39. During the first fifteen weeks of age, Avian breed had the highest body weight followed by Hypeco, but during the weeks later Shaver breed was the heaviest followed by Avian breed. There were significant differences ($p<0.001$) in body weight between flocks. But there were no significant differences ($p=0.733$) in the same trait between the houses for all parent flocks.

Figure39 The relationship between body weight mean and age for different breeds (P-Rearing Period).



The differences were observed in live body weight between the genders. There were no significant differences (P=0.107) in body weight between different months of the year. But the differences were significant ($p<0.001$) between breeding years. Figure.40 shows the relationship between different years and body weight for all breeds.

Figure.40 The relationship between years and body weight for all breeds (P. Rearing Period).



The heaviest body weight mean was recorded by Hypeco and Shaver breeds during the years 1990 and 2000. But the lowest was recorded during the year 1998 by Shaver breed.

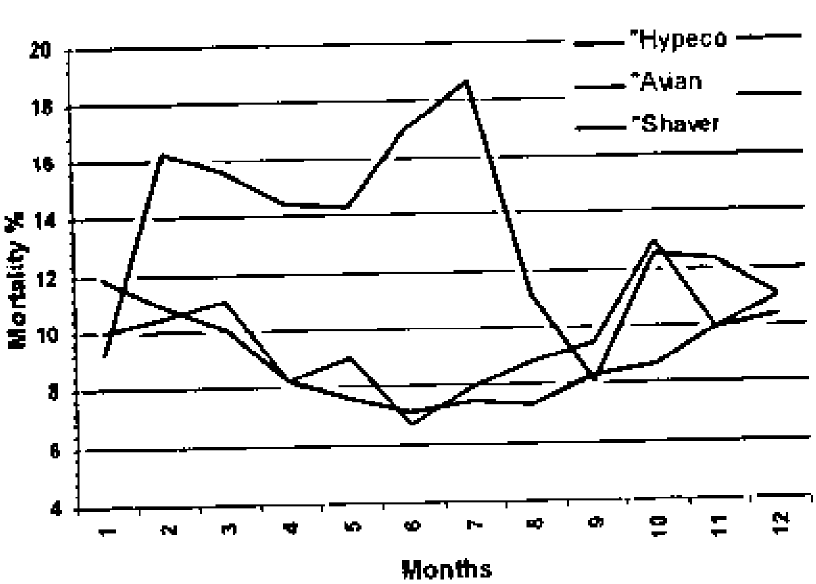
2.1.3.Cumulative Mortality:

The variance components of cumulative mortality are presented in Table.17 (Appendix). There were no significant differences (P=0.372) between projects (locations). But the differences ($p<0.001$) in cumulative mortality between breeds were observed. The highest ($P<0.05$) mortality was for Shaver breed followed by Avian (Table.7).

There were significant differences ($P<0.001$) in cumulative mortality between parent and between grand-parent flocks. But between parent flocks houses There were no significant differences (P=0.372). On the other hand, There were significant differences ($p<0.001$) in cumulative mortality between sexes.

There were significant differences ($p<0.001$) in cumulative mortality between months of the year. Differences between breeds mortality related to the months for all breeds are given in Figure.41.

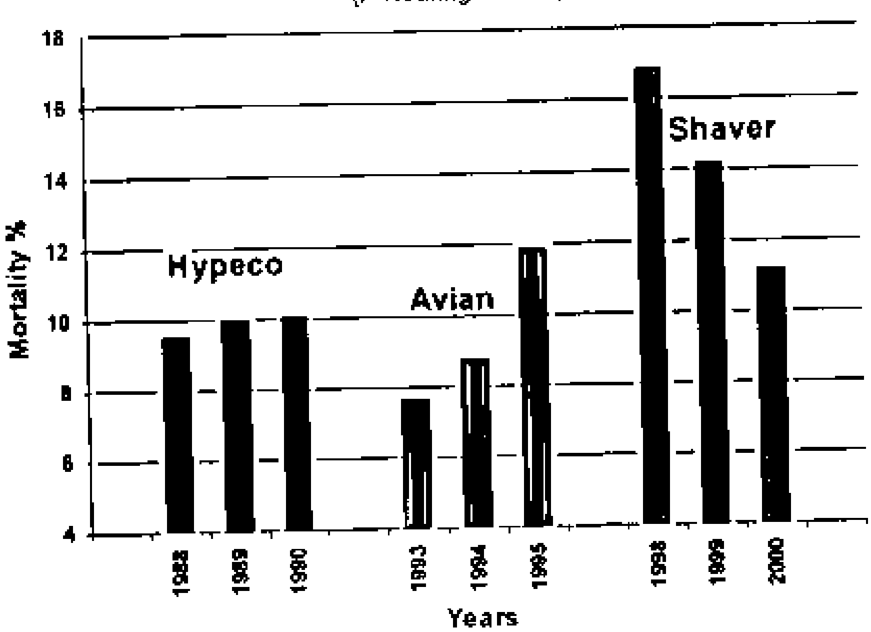
Figure.41 The relationship between percentage of mortality and months for differente breeds (P.Rearing. Prod.).



The highest mortality percent was observed during June and July for Shaver breed, also, the lowest mortality was recorded during the same months by Hypeco and Avian breeds. However, the highest mortality percent for Hypeco and Avian breeds was observed during January and October respectively, whereas, the lowest mortality percent for Shaver breed was during January.

There were significant differences ($p<0.001$) in cumulative mortality between breeding years. Figure.42 shows the relationship between different years and mortality percent for all breeds. It is clear that the highest mortality percent was recorded by Shaver breed during the year 1998, whereas, the lowest was recorded during the year 1993 by Avian breed.

Figure .42 The relation ship between cum. mortality percent and breeding years for different breeds (P-Reanng Period).



2.2. Production period:

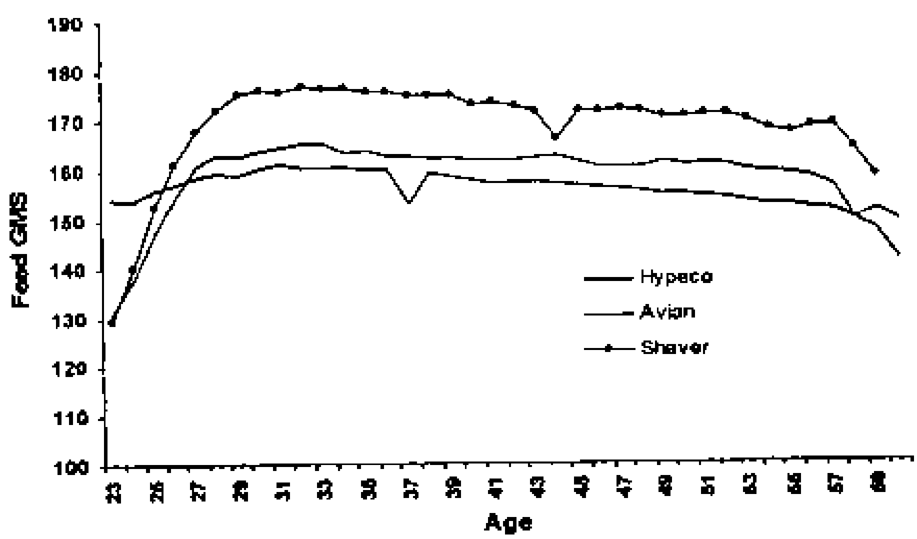
2.2.1. Feed Traits

a. Bird daily feed consumption (GMS):

Table.18 (Appendix) shows variance components of daily feed consumption. There were significant differences (P<0.001) in bird daily feed consumption between projects. In Ghout El-sultan daily feed consumption was high (165.86 ± 0.376) in comparing with Tawargha project (157±0.409) as shown in (Table.8).

There were significant (P<0.001) differences in bird daily feed intake between the breeds (Table.8). The Hypeco breed had the lowest (P<0.05) amount of feed consumption (155.80 ± 0.333) followed by Avian (159.78 ± 0.509). However, the relationship between age and daily feed consumption is presented in (Figure.43).

Figure.43 The relationship between daily feed consumption and age for different breeds (P-Prod. Period).



Daily feed consumption for Avian and Shaver breeds was low during the first weeks of production period. After the week 27 Shaver breed had the highest daily feed consumption followed by Avian breed until the end of the period. The flocks had significant (p<0.001) effect on the daily feed consumption of the birds.

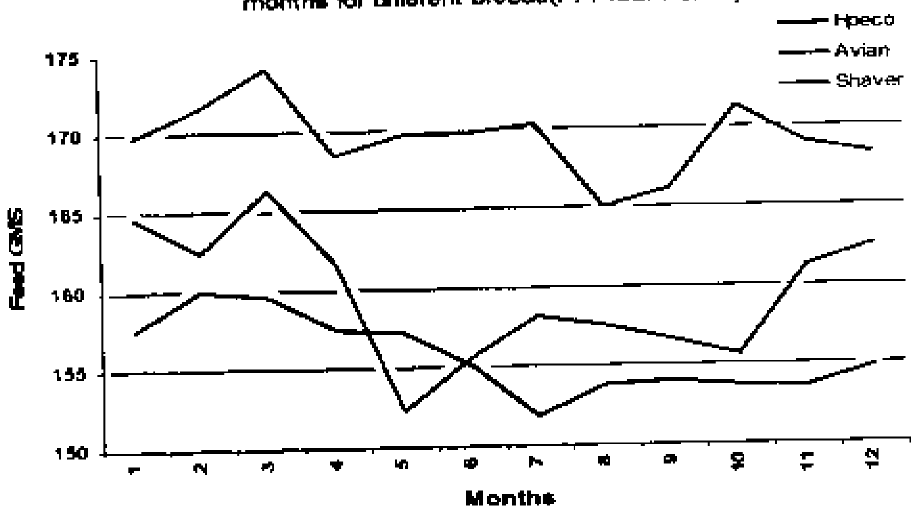
Table.8 Mean and standard error of feed traits and egg traits for different breeds at both projects (P. Prod. Period).

Factor	Levels	N	Feed –Bird /Day GMS	Feed/ Hen housed KGS	Hen housed egg prod. EGGS	Hen hous. Hatch. egg EGGS
			Mean ± S.E	Mean ± S.E	Mean ± S.E	Mean ± S.E
Project	*Ghout*	983	165.86 ± 0.376^{b}	24.816 ± 0.408^{b}	77.122 ± 1.437^{a}	67.714 ± 1.333^{b}
	Tawar.	954	157.37 ± 0.409^{a}	22.795 ± 0.384^{a}	75.977 ± 1.480^{b}	68.136 ± 1.421^{a}
Breed	*Hypeco*	658	155.80 ± 0.333^{c}	23.554 ± 0.471^{b}	80.859 ± 1.848^{a}	71.455 ± 1.717^{a}
	Avian	647	159.78 ± 0.509^{b}	23.971 ± 0.489^{a}	75.590 ± 1.753^{b}	68.608 ± 1.682^{b}
	Shaver	632	169.73 ± 0.503^{a}	23.944 ± 0.504^{a}	73.070 ± 1.738^{c}	63.541 ± 1.641^{c}

Means having uncommon superscripts differ significantly ($P<0.05$).

There were significant ($p<0.01$) differences in daily feed consumption between different months of the year. Figure.44 shows the relationship between bird's daily feed consumption and different months of the year. The highest amount of daily feed consumption was observed during March for Shaver and Avian, whereas, the highest consumption for Hypeco was observed during February. The lowest amount was observed during summer months for all breeds.

Figure.44 The relationship between daily feed consumption and months for different breeds(P. Prod. Period).



There were significant differences ($P<0.001$) in daily feed consumption between breeding years.

Figure.45 The relationship between years and daily feed cons. for different breeds (P. Prod. Period).

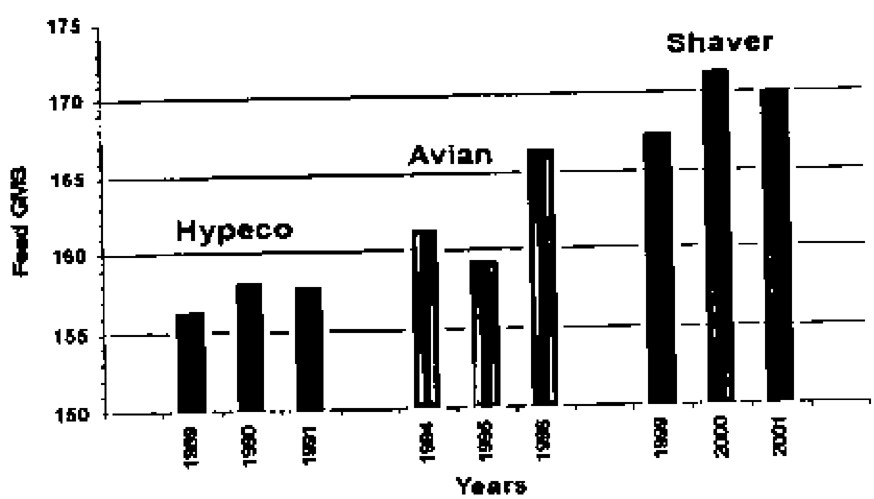


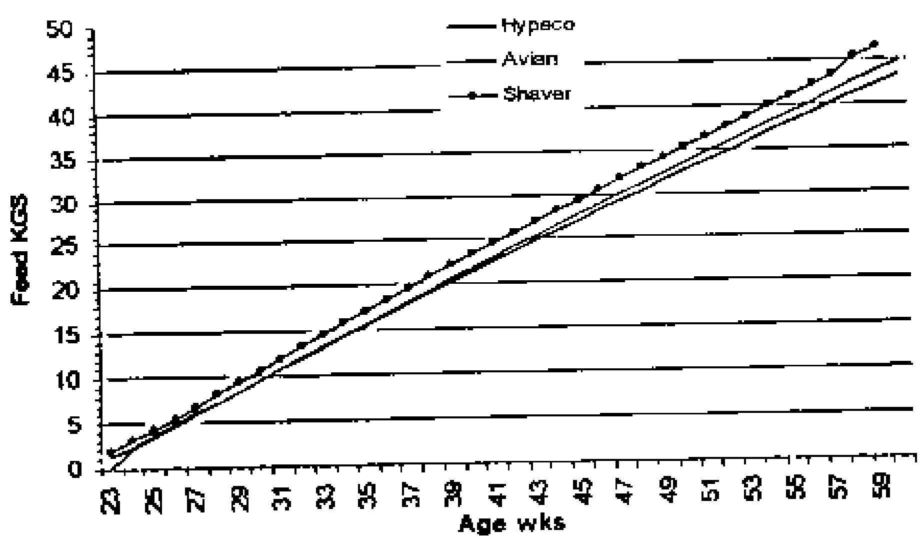
Figure.45 shows the relationship between the different years and daily feed consumption for all breeds. The highest daily feed consumption was observed during the year 2000 for Shaver breed but the lowest was recorded by Hypeco breed during the year 1989. In general, Hypeco breed was recorded lower rate of daily feed consumption in comparing with the other breeds in all years.

b. Hen-housed feed consumption (KGS):

Variance components of hen-housed feed consumption are shown in table.19 (Appendix). There were significant differences ($P<0.001$) in hen-housed feed consumption between projects. In Ghout El-sultan hen-housed feed consumption was high (24.816±0.408) in in comparing with Tawargha project (22.795±0.384) as shown in (Table.8).

There were significant ($P<0.001$) differences in hen-housed feed consumption between the breeds (Table.8). There were no significant differences ($p>0.05$) in hen-housed feed consumption between Avian and Shaver breeds. But the lowest ($P<0.05$) hen-housed feed consumption was recorded by Hypeco breed. However, the relationship between age and hen-housed feed consumption is presented in (Figure.46).

Figure.46 The relationship between hen-housed feed consumption and age for different breeds (P-Prod. Period).

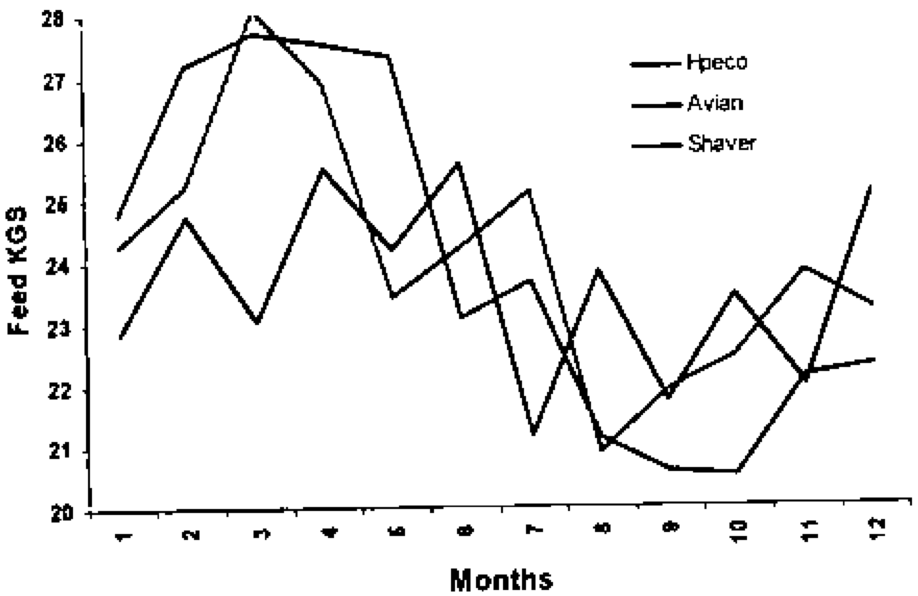


Hen-housed feed consumption for Shaver breed was highest during all weeks of production period followed by Avian breed, whereas, Hypeco breed had the lowest rate of hen-housed feed consumption.

There were significant differences (p<0.001) in hen-housed feed consumption between different flocks.

There were significant differences (p<0.001) in hen-housed feed consumption between different months of the year. Figure.47 show the relationship between hen-housed feed consumption and different months of the year.

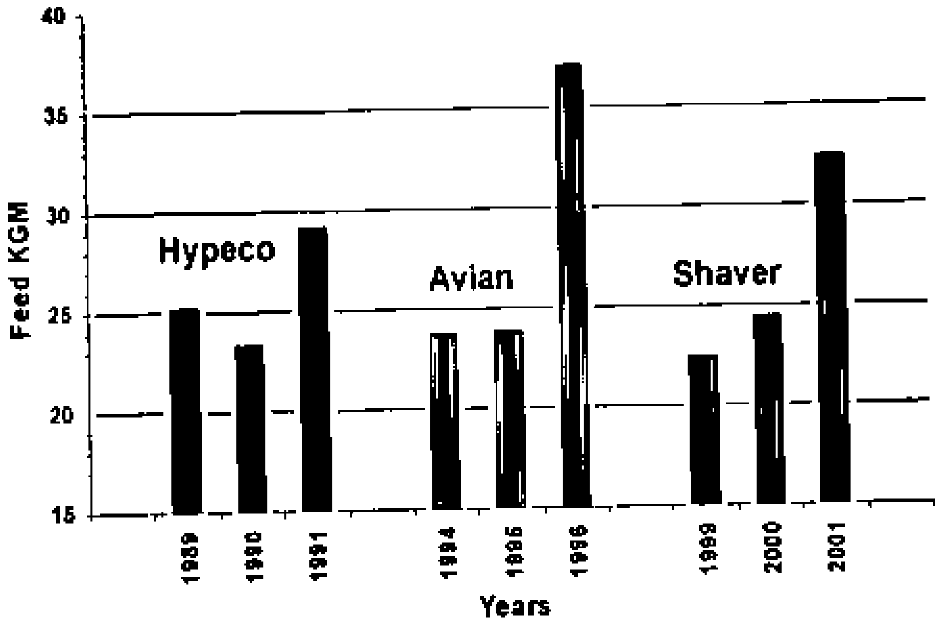
Figure .47 The relation ship between hen-housed feed consumption and months for different breeds (P. prod. period).



The highest amount of hen-housed feed consumption was observed during spring season for all breeds, whereas, the lowest amount was observed during summer season.

There were significant differences (P<0.001) in hen-housed feed consumption between breeding years. Figure.48 shows the relationship between the different years of breeding and hen-housed feed consumption for all breeds.

Figure.48 The relationship between years and hen-housed feed consumption for different breeds (P. Prod. period).



The highest bird-housed feed consumption rate was observed during the years 1996 for Avian breed. In the same case, the lowest rate of bird-housed feed consumption was recorded by Shaver breed during the year 1999.

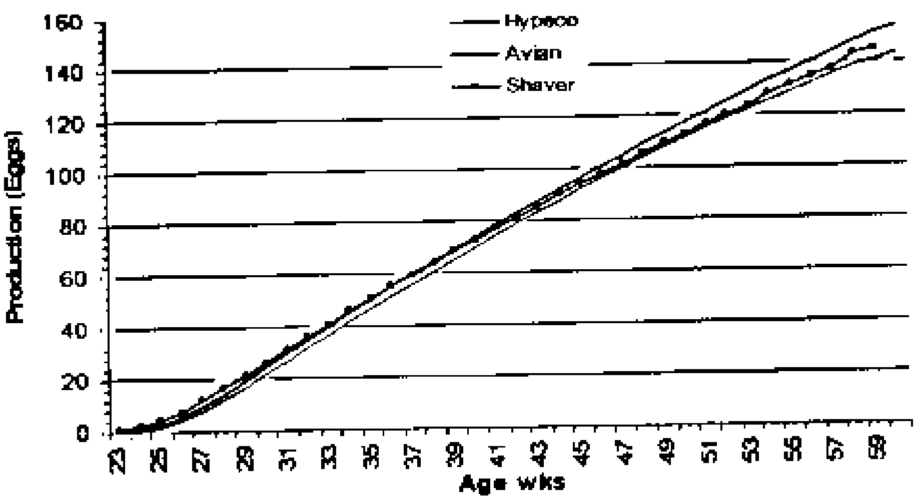
2.2.2. Egg Traits

a. Hen-housed egg production (Eggs):

Variance components of hen-housed egg production are shown in Table.20 (Appendix). There were significant differences ($P<0.05$) in hen-housed egg production between projects. In Ghout El-sultan hen-housed egg production was high (77.122±1.437) compared with Tawargha project (75.977±1.480) as shown in (Table.8).

There were significant ($P<0.001$) differences in hen-housed egg production between the breeds (Table.8). The highest hen-housed egg production was recorded by Hypeco breed (80.859 ± 1.848) followed by Avian (75.590 ± 1.753). However, the relationship between age and hen-housed egg production is presented in (Figure.49).

Figure.49 The relationship between hen housed egg production and age for different breeds (P-Prod. Period).



Hen-housed egg production for Shaver breed was the highest until the week 39 of production period, then later Hypeco had the highest hen-housed egg production rate until the end of production period. Avian breed had low hen-housed egg production rate at all stages.

There were significant (P<0.001) differences in hen-housed egg production between flocks.

There were significant differences (p<0.001) in hen-housed egg production between different months of the year. Figure.50 shows the relationship between hen-housed egg production and different months of the year.

The lowest rate of hen-housed egg production was observed during August and September for Shaver and Avian breeds respectively. Whereas, the highest hen-housed egg production was observed during April and June.

There were significant differences (P<0.001) in hen-housed egg production between breeding years. Figure.51 shows the relationship between the different years of breeding and hen-housed egg production for all breeds. The highest hen-housed egg production rate was recorded by

Avian breed during the year 1996. In the same case, the lowest rate of hen-housed egg production was observed during the year 1999 for Shaver breed.

Figure .50 The relationship between hen housed egg production and different months for all breeds (P. prod. period).

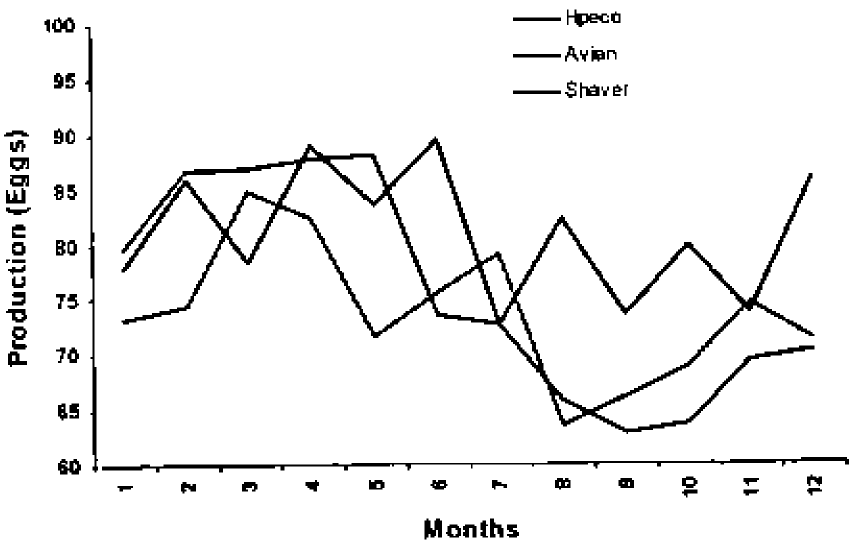
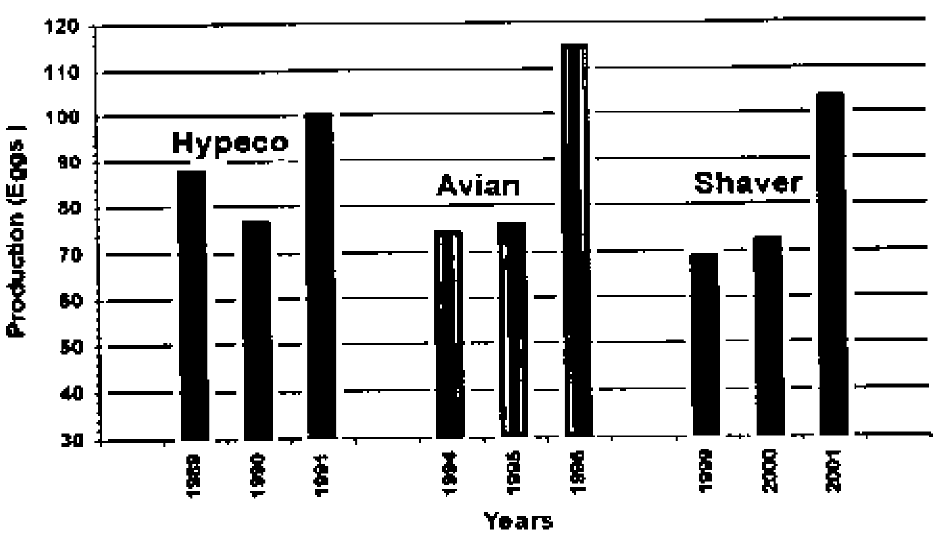


Figure.51 The relationship between years and hen housed egg production for all breeds (P. Prod. Period)

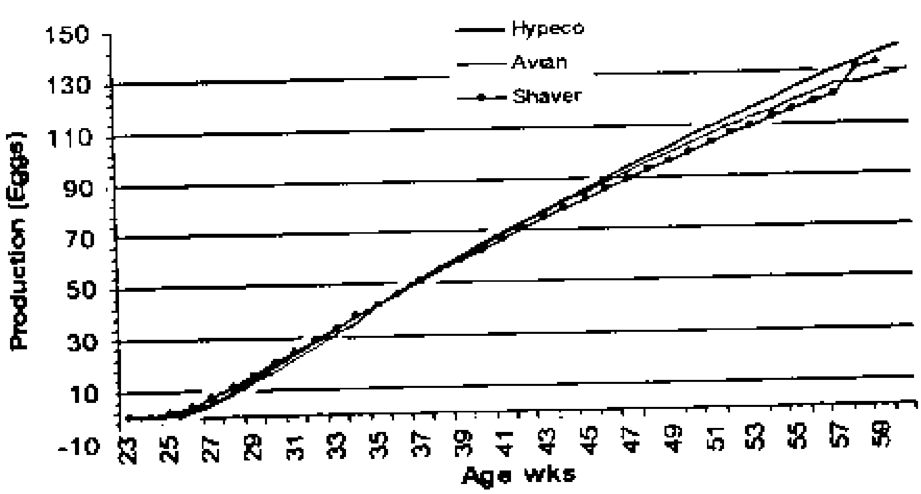


b. Hen-housed hatching egg production:

Variance components of hen-housed hatching egg production are shown in table.21 (Appendix).There were significant differences (P<0.01) in hen-housed hatching egg production between projects. In Ghout El-sultan project hen-housed hatching production was low (67.714±1.333) in comparing with Tawargha project (68.136±1.421) as shown in (Table.8).

There were significant (P<0.001) differences in hen-housed hatching egg production between the breeds (Table.8). The highest hen-housed hatching egg production was recorded by Hypeco breed (71.455 ± 1.717) followed by Avian (68.608 ± 1.682). However, the relationship between age and hen-housed hatching egg production is presented in (Figure.52). Hen-housed hatching egg production for Shaver breed was highest until the week 39 of production period, then later Hypeco had the highest hen-housed hatching egg production rate until the end of production period where Shaver had the lowest rate. Avian breed had a medium hen-housed hatching egg production rate at all stages.

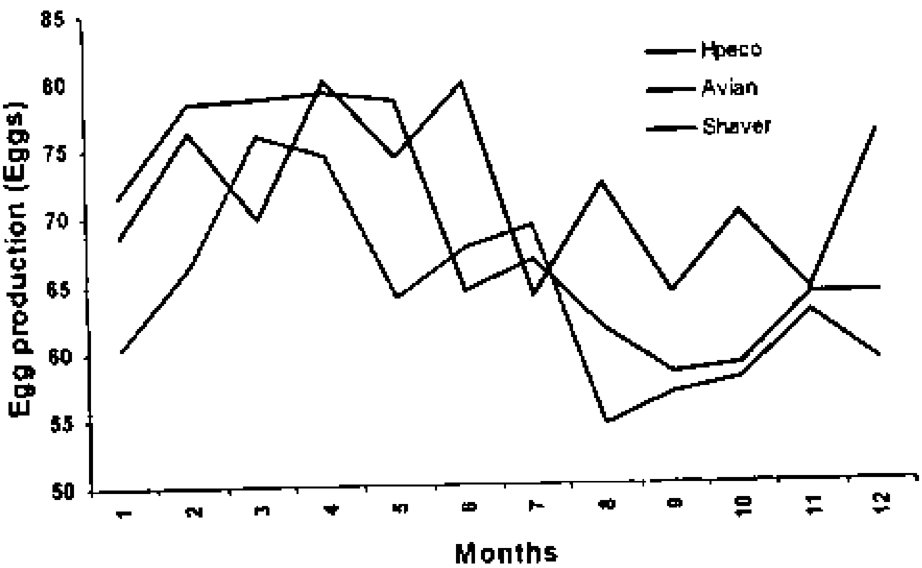
Figure .62 Relation ship between hen housed hatch. egg production and age for different breeds (P-Prod. Period).



There were significant (P<0.001) differences in hen-housed hatching egg production between different flocks.

There were significant differences (p<0.001) in hen-housed hatching egg production between different months of the year. Figure.53 shows the relationship between hen-housed hatching egg production and different months of the year.

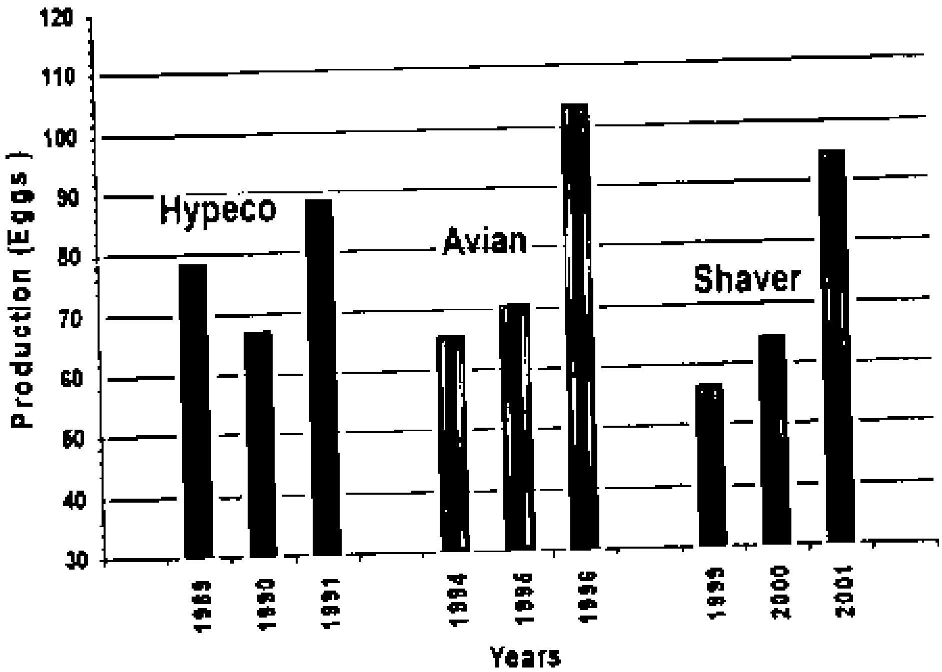
Figure .53 The relationship between hen-housed hatch. egg production and months for different breeds (P. Prod. Period).



The lowest rate of hen-housed hatching egg production was observed during August and September for all breeds respectively. Whereas, the highest hen-housed hatching production was observed during March and April.

There were significant differences (P<0.001) in hen-housed hatching egg production between breeding years. Figure.54 shows the relationship between the different years of breeding and hen-housed hatching egg production for all breeds. The highest hen-housed hatching egg production rate was observed during the year 1996 (for Avian breed). In the same case, the lowest rate of hen-housed hatching egg production was recorded by Shaver breed during the year 1999. In general, Hypeco breed had a higher rate of hen-housed hatching egg production in comparing with the other breeds.

Figure.64 The relationship between years and hen housed hatching egg production for different breeds (P-Prod. period)

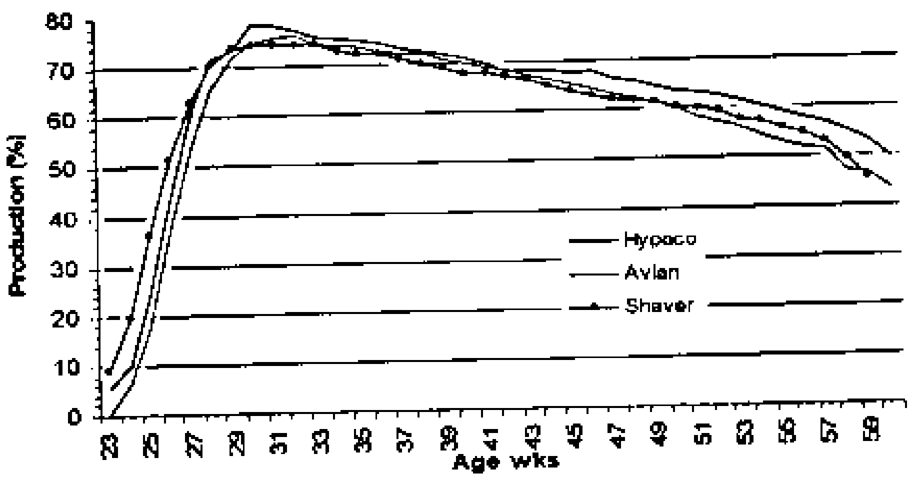


c. Hen-daily egg production (%):

Variance components of hen-daily egg production are shown in table.22 (Appendix). There were no significant differences (P>0.05) in hen-daily egg production between projects.

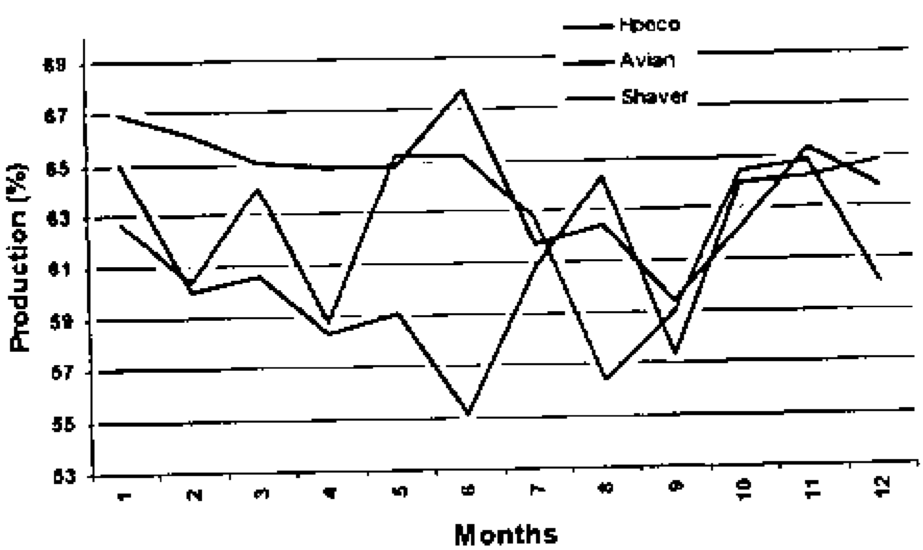
There were significant (P<0.001) differences in hen-daily egg production between the breeds (Table.9). The highest hen-daily egg production percent was recorded by Hypeco breed (64.29 %) followed by Shaver (62.09%). However, the relationship between age (wks) and hen-daily egg production is presented in (Figure.55). Hen-daily egg production for Shaver breed was the highest until the week 28 of production period, then later Hypeco had the highest hen-daily egg production rate until the end of production period. Avian breed had the lowest hen-daily egg production rate at first weeks until the week 30 where the Shaver breed had the lowest rate until the week 49, at this age hen-daily egg production for Shaver was increased and Avian breed rate was declined.

Figure.55 The relationship between hen-daily egg production percent and age for different breeds (P-Prod. Period).



There were significant (P<0.001) differences in hen-daily egg production between different flocks. There were significant differences (p<0.001) in hen-daily egg production between different months of the year. Figure.56 shows the relationship between hen-daily egg production and different months of the year.

Figure.56 The relationship between hen-daily egg production and months fordifferent breeds (P. prod. period).



The lowest rate of hen-daily egg production was recorded during June, August, and September (Summer months) by Avian, Shaver, and Hypeco breeds respectively. Whereas, the highest hen-daily egg production was observed during January, May and June for the same breeds respectively. There were significant differences (P<0.001) in hen-daily egg production between breeding years.

Figure.57 The relationship between years and hen-daily egg production for different breeds (P. Prod. Period)

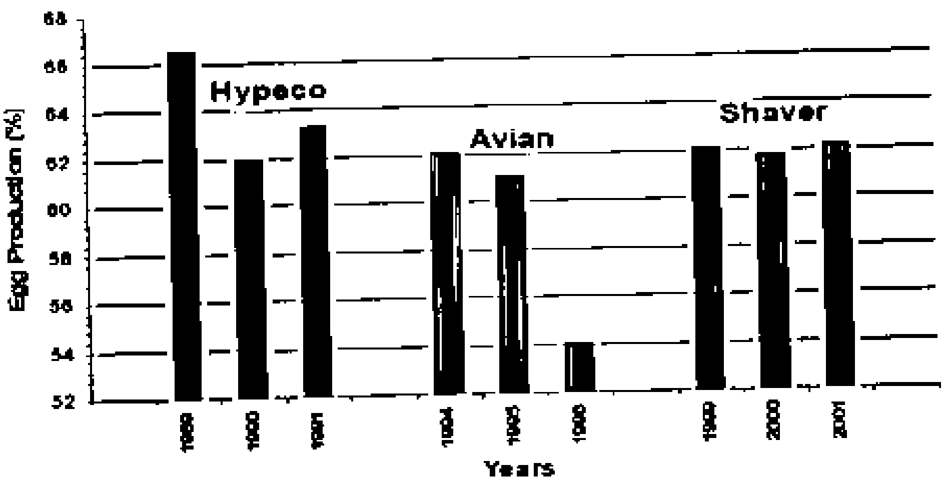


Figure.57 shows the relationship between the different years of breeding and hen-daily egg production for all breeds. The highest hen-daily egg production was observed during the year 1989 (Hypeco breed). In the same case, the lowest hen-daily egg production was recorded by Avian breed during the year 1996. In general, the first years (Hypeco breed) had a higher hen-daily egg production in than other years (breeds).

d. Hen-daily hatching egg production (%):

Variance components of hen-daily hatching egg production are shown in table.23 (Appendix). There were no significant differences (P>0.05) in hen-daily hatching egg production between projects.

There were significant (P<0.05) differences in hen daily-hatching egg production between the breeds (Table.9). The highest hen-daily hatching egg production percent was recorded by Hypeco breed, but Avian and Shaver breeds had same rates. However, the relationship between age and hen-daily hatching egg production is presented in (Figure.58).

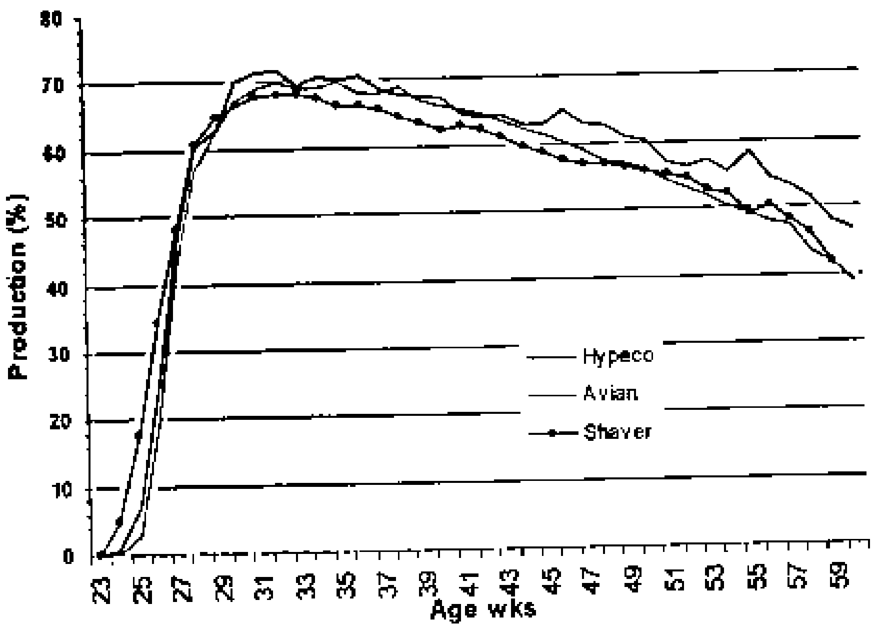
Table.9 Egg traits and mortality Percent for different breeds in both projects (P- Prod. Period).

Source of variance	*Levels*	N	Hen daily egg prod. %	Hen daily hatch. Egg %	Mortality %
Project	*Ghout*	983	62.005^{a}	56.064^{a}	7.778^{b}
	Tawar.	954	63.083^{a}	57.451^{a}	7.552^{a}
Breed	*Hypeco*	658	64.290^{a}	58.369^{a}	6.096^{c}
	Avian	647	61.179^{c}	56.457^{b}	8.130^{b}
	Shaver	632	62.097^{b}	55.355^{b}	8.829^{a}

Mortality at any stage also include culled birds.

Means having uncommon superscripts differ significantly ($P<0.05$).

Figure.58 The relationship between hen-daily hatch. egg production and age for different breeds (P-Prod. Period).

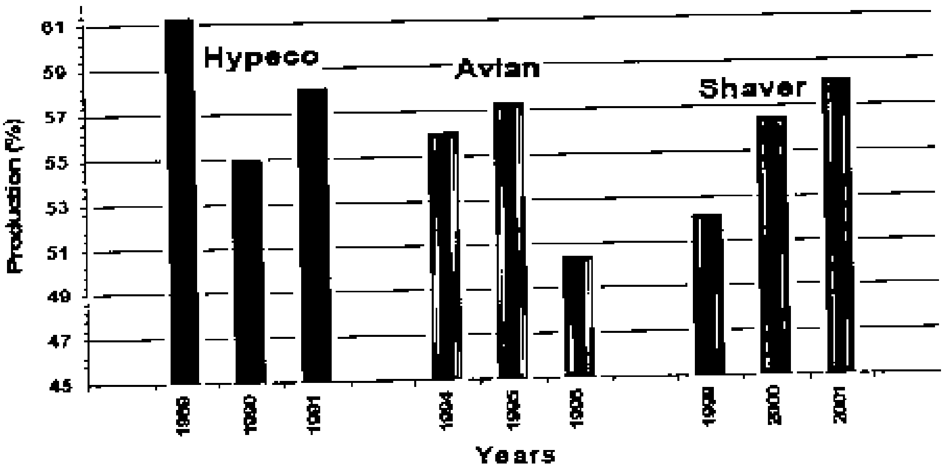


Hen-daily hatching egg production for Shaver breed was highest followed by Hypeco breed until the week 28 of production period, then later, Hypeco had the highest hen-daily hatching egg production rate until the end of production period. However, Avian breed had a lowest hen-daily hatching egg production rate at first weeks until the week 30 where was Shaver breed had the lowest rate until the week 49, at this age hen-daily hatching egg production for Shaver was increased and Avian breed rate was declined. In general, the highest production peak was recorded by Hypeco breed.

There were significant differences ($P<0.01$) in hen-daily hatching egg production between different flocks. But there were no significant differences ($p>0.05$) in hen-daily hatching egg production between the different months of the year.

There were significant differences ($P<0.01$) in hen-daily hatching egg production between breeding years. Figure.59 shows the relationship between the different years of breeding and hen-daily hatching egg production for all breeds.

Figure.59 The relationship between years and hen daily hatching egg production for different breeds (P. Prod. Period)



The highest hen-daily hatching egg production rate was observed during the years 1989 (Hypeco breed), but the lowest recorded by Avian breed during the year 1996. In general, the first years (Hypeco) had high hen-daily hatching egg production in comparing with the other years (breeds).

2.2.3. Cumulative mortality percent:

Variance components of cumulative mortality are shown in table.24 (Appendix). There were significant differences ($P<0.001$) in females cumulative mortality between projects (Table.9). Cumulative mortality percent in Ghout El-sultan was high (7.778%) in comparing with Tawargha project (7.552%).

There were significant ($P<0.001$) differences in cumulative mortality between the breeds (Table.9). The highest cumulative mortality was recorded by Shaver breed (8.829%), but the lowest was recorded by Hypeco breed (6.096%). However, the relationship between age and females cumulative mortality is presented in (Figure.60).

There were significant differences ($p>0.001$) in cumulative mortality between different Flocks.

There were significant differences ($p>0.001$) in cumulative mortality between different months of the year.

Figure.60 The relationship between percentage of cum. mortality and age for different breeds (P-Prod. Period).

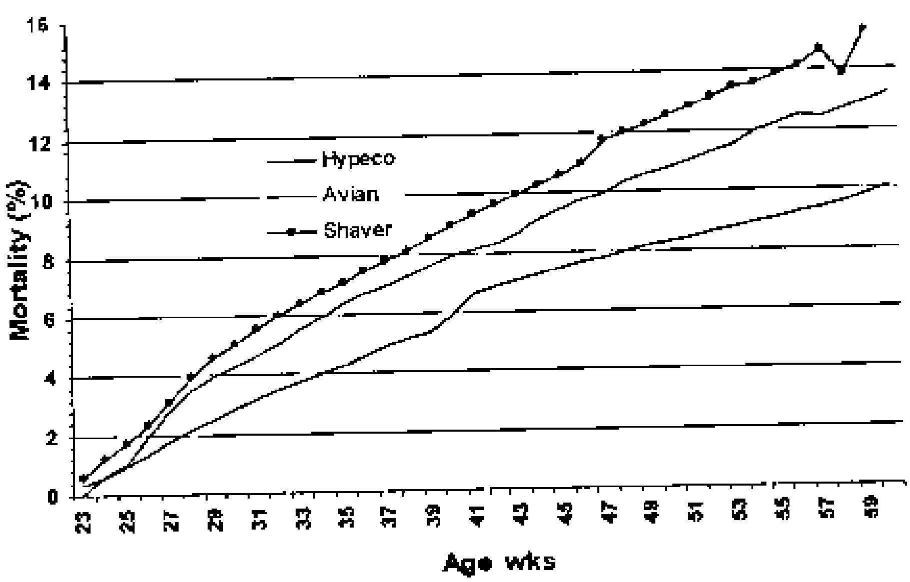
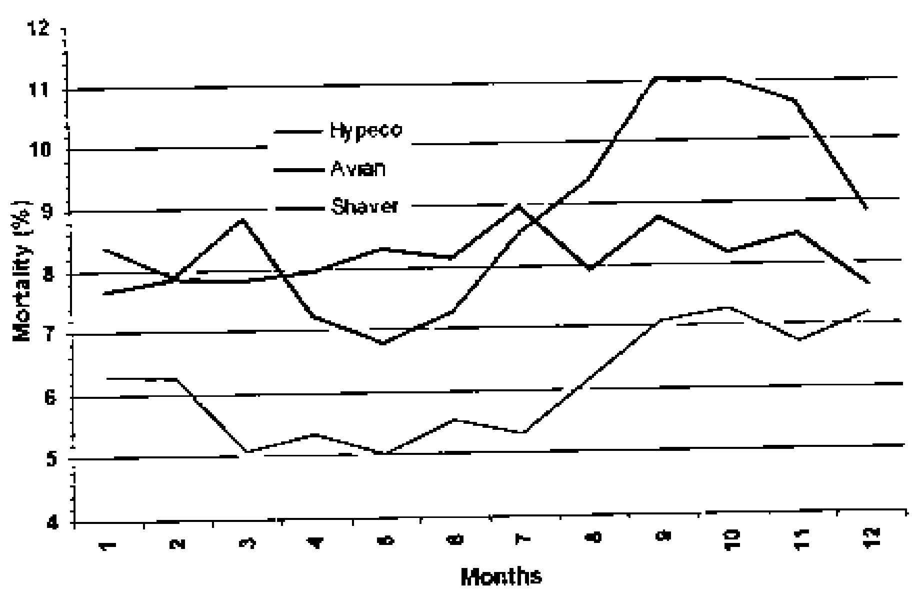


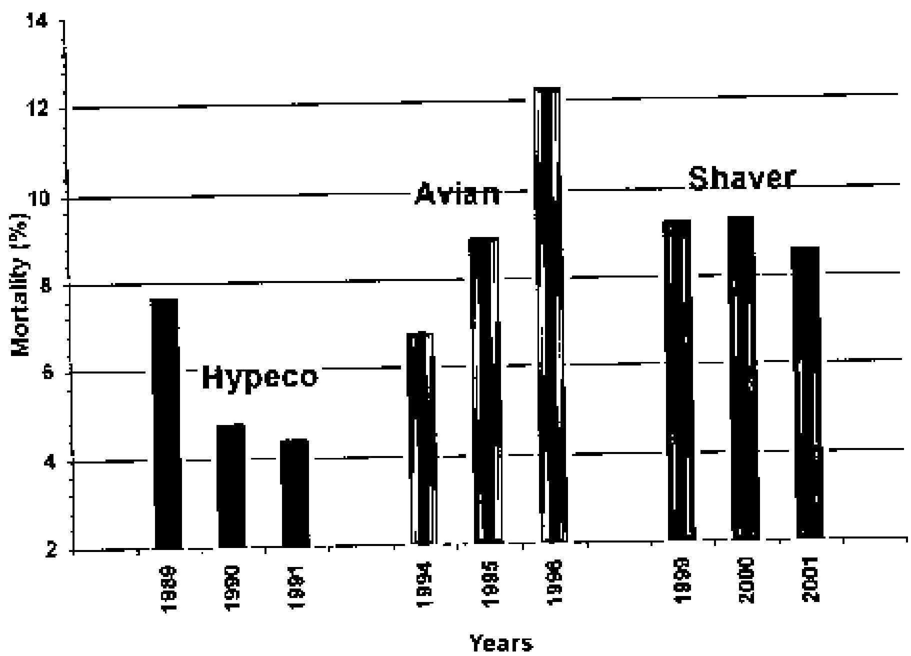
Figure.61 shows the relationship between different months and cumulative mortality for all breeds. In general, cumulative mortality in second half of the year was higher than as it was in the first half. The highest mortality for Shaver and Hypeco breed was observed during September and October, while, Avian breed was recorded highest mortality during July.

Figure.61 The relationship between percentage of cum. mortality and different months for different breeds (P. Prod. Period).



There were significant differences ($P<0.001$) in cumulative mortality between breeding years as shown in (Figure.62). The highest mortality percent was observed during the years 1996 (Avian breed), in the same case, the lowest was observed during the year 1991.

Figure.62 The relationship between cum. mortality and years for different breeds (P. Prod. Period).



Discussion

1. Grandparent and parent lines rearing periods :

1. 1. Feed traits :

The locations (projects) were had no significant effects on feed traits in both grand and parent lines rearing period. These results may relate to the controlled environment in the housing bens and due to the low variation in climate conditions between the two locations. This is in agreement to the finding of Mathur and Horst, (1995) who suggest that in cases in which locations are quite similar in their general climate and management conditions, G x E interaction have been found to be non significant. However, the differences between the two projects were seldom or less than any other factors in all traits studied.

The Avian breed was found to have high daily feed consumption in grandparents during rearing period but the Hypeco breed recorded the highest amount in parents. But Shaver breed was recorded low and middle daily feed consumption in grandparents and parents respectively. These differences in feed consumption may caused by the differences between genotypes as indicated by Hancock *et al.* (1995). On the other hand, the differences between breeds may relate to growth potential of the breeds (Sarker et al. 2002). Regarding to tables (3, 7), the breeds which produce the high body weight required more daily feed consumption. This suggestion better in agreement with the finding of Lesson *et al.* (1997) and May et al. (1998).

The differences were not significant between Hypeco and Shaver breeds in daily feed consumption in grandparents, but the differences were significant in bird cumulative feed consumption. Hypeco breed, however, was recorded a higher cumulative feed consumption, on the other hand, Shaver breed was recorded a higher cumulative feed consumption followed by Hypeco breed in parents. Regarding to the figures (4,34) it is appear that the differences between breeds in cumulative feed consumption were observed in the weeks 7 and 18 in grandparents, but in parents it was observed in the week14. This observations indicate that the differences in cumulative feed consumption can be explained by the differences in selection programs. This is in agreement with the recommendation of Avian breed management guide (1994) and Hypeco breed management guide (1987). However, the actual feed consumption amount is depending on factors such as housing conditions, temperature, feed quality, body weight, uniformity, beak trimming, and flock health as recommended by Avian breed management guide (1994). The Hypeco and Shaver breeds were recorded the lowest bird housed feed consumption in grandparents and parents respectively. These results may caused by high mortality in both breeds comparing with Hypeco breed.

The results of this study showed significant differences between flocks in all feed traits. These differences may caused by daily practices, flock size, hygienic conditions, and housing density. This is in agreement with the finding of Farooq *et al.* (2002).

Male lines were have the highest daily and cumulative feed consumption in grandparents comparing with female lines. Also, lines A and B recorded higher daily and cumulative feed consumption than those in the lines C and D respectively table (4). The same results were observed in parents when males recorded higher feed consumption than females. However, parents males and females were a progeny of grandparents male and female lines respectively. These results indicate that the male lines may selected to produce more body weight and as a result they consumed more feed, but females consumed less rate of feed due their attend to reproduce. However, this results in agreement with Cahaner *et al.* (1987), Jiang *et al.* (1999), Rondelli *et al.* (2003), Reddish and Lilburn (2004), and Fanatico *et al.* (2005). The differences in feed traits were absence between breeds during the different months of the year in the grandparents. This may be recorded due to the good control of housing environment, special car, and small flocks, of grandparent comparing with parent lines. Regarding to the Figures (32, 35) its appear that the breeds studied had differential feed performance in the different months. It can be observe that the Hypeco breed performed well during moderate and cold months, whereas, Avian breed preferable moderate and hot months, but Shaver breed attend to be affected more with the changes between seasons. However, these differences can be relate to differences in adaptability for the breeds as indicated by Yalcin, *et al.* (2001). In general, Production strategies must consider not only nutrition, but also the genetic background of the particular broiler strain being utilized Lilburn (2000).

1. 2. Body weight :

The differences which were observed in body weight between projects in parent lines but not in grandparents may be caused due the differences in daily rearing programs which may better in grandparents.

The differences between breeds in body weight in both grand and parent lines were due to the genetic background more than environmentally. This is in agreement with the finding of Hancock *et al.* (1995), Deeb and Cahaner, (2001-b), Moreira, *et al.* (2003) and Santos *et al.* (2005).

Grandparents were advanced in body weight, this may be due to that the grandparents were purebred but parents were a crosses produced from grandparents. However, the highest body weight mean was recorded by Avian (1683 GMS) and Hypeco (1569 GMS) in grandparents and parents respectively. However, differences between breeds in body weight in agreement with the previous studies (Barbour et al. 1996). The results of this study showed significant differences between flocks in body weight. These differences may cause due to the daily practices, and flock size.

Male lines were have the highest body weight in grandparents comparing with female lines. Also, male line males (A sex segment) and male line females (B sex segment) recorded higher body weight than those in female line males (C sex segment) and female line females (D sex segment) respectively table (4).The same results were observed in parent lines when males recorded higher body than females. However, parent lines males and females were a progeny of grandparent's male and female lines respectively. The advantage of males in body weight may caused by continues selection process. However, this results in agreement with the finding of Schmidt, *et al.* (1991), Custodio *et al.* (1997), Emmerson, (1997), Mignon-Grasteau, *et al.* (2000), Viana, *et al.* (2001), and Reddish and Lilburn (2004).

The effect of the months of the year have been observed clearly between breeds in grandparents but absent in parent lines, however, this differences can be related to the differences in the adaptability and heterosis. The breeds had differing responses to the different months in grandparents as explained in figure (8). These differences may relate to the interaction between genotype and seasons as suggested by Settar *et al.* (1999). The Hypeco breed had better body weight performance during the moderate and warm months but the Avian breed was performed well during moderate and cold weathers. This indicates in agreement with the finding of Yalcin *et al.* (1997a) who find a significant interaction for body weight between seasons and stocks, Yalcin *et al.* (1997b), Yunis and Cahaner (1999), Deeb *et al.* (2002) and Rahman *et al.* (2003).

The differences in live body weight according the years were observed only in parents. Regarding to figure (40), all three breeds had ascending trends of body weight mean but the higher body weight were recorded in first years (Hypeco breed period). These results indicate that the breeds had good adaptability to the region conditions. So, it can be conclude that the differences in body weight occurred due to genetic and management factors such as decreasing in projects efficiency, differences in management programs, and market situation. This is in agreement with the finding of Santos *et al.* (2005) who find a differences in breeds performance between two systems of management.

1. 3. Cumulative mortality percent :

The mortality was include selected and culls birds, specially in grandparent lines, this may cause the differences between locations in grandparent. Therefore, we can suggest that the management procedure affecting cumulative mortality clearly.

Between breeds the differences were observed in both grand and parent lines. Hypeco breed was superior in cumulative mortality in parent lines, but better survival in grandparents was for Avian breed. In the fact, we can observe that the actual cumulative mortality for Hypeco and Avian was nearly to similar in grandparents except the selection periods (6 and 18 weeks of age) which had more mortality for Hypeco than Avian breed as shown in figure (9). Generally, the mean of cumulative mortality in grandparents was lower than those in parent lines, which can be relate to better control of rearing conditions. However, the differences between breeds can be caused by differences in selection density, management programs, and genetic background. This is in agreement with the results of Custodio *et al.* (1997) who observe a differences between breeds in a survival rate, and also the recommendation of (Avian breed Management Guide 1994) and Emmerson (1997).

The differences which recorded between flocks can be relate to the daily rearing operations and housing bens conditions as suggested by Farooq *et al.* (2002). However, due to the better care of male lines which resulted of less number of birds housed, the mortality was lower in male than those in female lines. This results disagreement with the finding of Schmidt *et al.*

(1991). In grandparents there were no significant differences observed between months and years in cumulative mortality, these observations impulse the good control of rearing environments which minimize the effect of climate factors. On the other hand, both of months and years exhibit high effect on breeds cumulative mortality percent in parent lines. Regarding to figure (41) its appear that the Hypeco and Avian breeds responded similarly to different months, but Shaver breed had different response. Hypeco and Avian breeds were recorded lower mortality during the hot months and consequently Shaver breed recorded higher mortality during the same months. This condition give an evidence to that the control of hot easier than those in cold environments under optimal conditions of rearing which were occurred in the first stages of projects age. The other possible reason of this result may due to the differences between breeds in hot resistance. This is in agreement with the finding of Yunis and Cahaner, (1999) and Yalcin, *et al.* (2001).

Regarding to the figure (42), the less cumulative mortality recorded by Hpeco breed with a nearly stable range in all breeding years, but Avian breed hah an ascending rate according the years, whereas, Shaver breed had a descending rates. However, these results can be relate to the more adaptability of Shaver breed and more genetic stability of Hypeco breed. In general, these observations may refer to the differences in genetic background between the breeds studied. This is in agreement with the finding of Yalcin, *et al.* (2001).

2. Grandparent and parent lines production periods :

2. 1. Feed traits :

The differences were observed between projects in all feed traits in parents in addition to daily feed consumption in grandparents. In all previous cases, Got El-sultan project exhibited higher consumption rates, this might due to the differences in management efficiency. However, the differences between projects recorded during production period, that's might be due to the high body weight of the birds in comparing with rearing period, so, climatic variation effects could be more serve in production period. This is in agreement with the finding of and Reece and Lott (1983), Cahaner and Leenstra (1992).

Regarding to the tables (5,8), Avian and Hypeco breeds recorded the lowest daily feed consumption in grandparents and parents respectively. This results had adverse trend to that recorded in the rearing period, this can be relate to the management strategies to avoid the unfavorable effect of overweighs. These results in agreement with the finding of Robins *et al.* (1993) and Harms *et al.* (1982) who relate the differences in body weight to daily feed intake. Also, these differences can be related to climate effects as suggested by Yalcin *et al.* (1997b). On the other hand, the results of bird and hen housed were had a same trend to that recorded in daily feed consumption.

The male lines were had higher rates in all feed traits which may result of differences in selection goals as indicated by Emmerson (1997).

Regarding to the figures (11,44), all breeds exhibit low daily feed consumption in summer seasons, but the high daily feed consumption was recorded during cold and moderate months in both grand and parent lines. This condition, however, reflexes the unfavorable effect of high ambient temperature on feed intake Cahaner and Leenstra (1992).

Also, its appear that the Shaver breed were less affected with the hot months comparing with the other breeds in daily feed consumption for both grandparents and parents. The highest rate hen housed feed consumption was recorded during the hot months in grandparents, but in parents the highest hen-housed feed consumption was recorded in cold months. This result, however, refer to the positive association between these traits and cumulative mortality percent as explained in figures

(14,30) and (47,61) in grandparents and parents respectively. The high rates of hen-housed feed consumption during hot months indicate that the mortality was more in old age birds which more affected with hot conditions. This is in agreement with the finding of Yalcin, *et al.* (2001) and Deeb, *et al.* (2002).

The differences in feed traits between years were clearer in parents than those in grandparents; this might be due the housing conditions. In figure (45), its clear that the Hypeco breed showed lower daily feed consumption in comparing with the other breeds. These differences can be relating to the management programs which might be different during the years. This is in agreement with the finding of Yalcin *et al.* (2001) and Farooq *et al.* (2002).

2.2 Egg traits :

a. Hen-housed egg production:

The differences between projects in hen-housed egg production in parent lines can be relate to the opposite effect of live body weight, as result, the less body weight in rearing period (Got El-sultan) exhibit higher hen-housed egg production. These results corresponded with the suggestions of Robinson *et al.* (1993).

The differences between breeds in hen-housed egg production for both grand and parent lines may resulted by the efficiency of projects equipments and management processes, so, Hypeco breed exhibit better results in both lines in comparing with other breeds.

The differences which observed between flocks in hen-housed egg production in both grand and parent lines may caused by the daily practices, and flocks circumstances as suggested by Farooq *et al.* (2002).

In grandparents, due to the differences in selection strategies, the lines which had lower body weight in rearing period exhibit higher hen-housed egg production. This is in agreement with the recommendation of

(Robinson, *et al.* 1993), but disagreement with the finding of Harms *et al.* (1982).

Hen-housed egg production for all breeds was high during hot months in grandparents, but the high hen-housed egg production recorded in cold months in parents (different responses) with high rates of hen-housed feed consumption, as regarding in the figures (14,17) and (47,50). Theses results, however, indicate that there are an association between feed consumption and egg production. The differences in previous responses between breeds in grand and parent lines can be relate to the genetic variations.

In grandparents, hen-housed egg production had variable rates during different years, where recorded a stable rate in first years (Hypeco breed period) and fluctuating rates in later years (Avian and Shaver breeds periods). That is may caused by differences in management circumstances. On the other hand, parent lines had ascending increase in hen housed egg production with elapsing years, this improvement in breeds performance gave a signal to the adaptation possibility to the native conditions, but this ability more clear in Avian and Shaver breeds. This is in agreement with the finding of Altamirano, (2005) who observe a variation between egg production breeds adaptability.

b. Hen-housed hatching egg production :

The differences between projects in hen-housed hatching egg production in parent lines can be relate to the differences in males percent as a management factor.

Due to the nearing of hatchability percent for breeds in the same line, so we can say that the differences in the rates of hen-housed hatching egg production resulted from the variation in previous trait (hen-housed egg production). However, by comparing the means of hen-housed and hen-housed hatching eggs, its appear that Avian breed had higher hatchability percent comparing to the other breeds in both lines. This superiority, however, may result due to the differences in genetic history. This is in agreement with the finding of Abiola *et al.* (2003).

The differences which observed between flocks in hen-housed hatching egg production in both grand and parent lines may caused by the daily practices, and flock condition. This conformed well to the finding of Mizubuti *et al.* (1994).

In grandparent lines, due to the differences in selection goals, the lines which had lower body weight in rearing period exhibit higher hen-housed hatching egg production. However, this result was similar to that found in hen-housed egg production due to the high association between two traits. In general, female lines may recorded higher hen-housed egg produce due to their tendencies to reproduce more than production and contrarily in male lines. This is in agreement with the suggestions of Emerson, (1997).

Hen-housed hatching egg production for all breeds was high during hot and cold months in grand and parent lines respectively (different responses) with high rates of hen-housed feed consumption, as regarding in the figures (14,20) and (47,53).This results, however, indicate that there are a association between feed consumption and egg production. The differences in previous responses between grand and parent lines may caused by genetic factors. These results conformed well to that recorded in hen-housed egg production.

In grand parent lines, hen-housed hatching egg production showed variability during different years, however, stable rates in first years (Hypeco breed period) were recorded and fluctuating rates in later years (Avian and Shaver breeds periods) as noted in figures (18,51). That is might be due to differences in management circumstances. On the other hand, regarding to figure (54) parent lines had ascending increase in hen housed hatching egg production with elapsing years, this improvement in breed's performance may relate to adaptation to native condition. However, same results were observed in hen-housed egg production trait.

c. Hen-daily egg production % :

The differences between projects were not significant in hen-daily egg production. This in agreement with obtains by Zaman *et al.* (2004).

In both grand and parent lines the advantage in hen-daily egg production achieved by Hypeco breed followed by Avian in grandparent and Shaver in parent lines. On the other hand, the variation in hen-daily egg production between the Shaver and Avian breeds was low comparing with Hypeco breed as recorded in tables (6,8). This trend of variation give an evidence to that differences might be due to management programs. However, differences were observed between meat poultry breeds in daily egg production by Barbour *et al.* (1996).

The differences which observed between flocks in hen-daily egg production in both grand and parent lines might be due to the daily practices, and flock circumstances. As we indicate in previous traits, in grandparent lines, due to the differences in selection goals, the lines which had lower body weight in rearing period exhibit higher hen-daily egg production percent. In general, female lines may achieved higher hen-daily egg production due to their tendencies to reproductive more than production and contrarily in male lines. This is in agreement with the finding of Custodio *et al.* (1997). As regarding in figures (23,56), the performance of all breeds in hen-daily egg production affected more with the differences between months in grand than those in parent lines. This variation effect might be due to high efficiency of environment control in grand parent lines, this can be relate to the small flock size and less number of farms in grandparents comparing with parents. In grand parent lines, Hypeco breed exhibit high daily egg production in all months, whereas, Avian and Shaver breed exhibited decrement performance during hot months (August and September) which characterized by high higher humidity. These differences, however, can be explained by fallback of projects equipments efficiency with years expiry.

The actual effect of the months on daily egg production appeared clearly in parent lines, where Avian breed exhibited low resistance to hot climates (months) followed by Shaver breed. This result give an indicator to that the progeny of Hypeco and Shaver grand parent lines had more adaptability than Avian breed.

The trend of hen-daily egg production according different years gives other indicator to the differences between breeds in adaptability. These differences appears clearly in figures (24,57), where Hypeco breed recorded nearly stable rates in grand parent lines and ascending trend in parent lines, whereas, Avian breed had descending trend according the years which it was used in during grand and parent lines, and finally, Shaver breed daily egg production trend had ascending and nearly stable in grand and parent lines respectively during the period which was used in. These facts, however, indicating to that the adaptability of Avian breed to the local conditions was poorer than the other breeds. Further, due to the differences between management programs and projects efficiency which were less in later years, its appear that Shaver breed was more adaptive and resistant to the native environment. As a result, the differences between breeds in daily egg production can be relate to the variations in genetic background and selection histories. This is in agreement with the finding of Barbour *et al.* (1996) and Altamirano (2005).

d. Hen-daily hatching egg production % :

As recorded in hen-daily egg production, there were no significant differences between projects (location) in hen-daily hatching egg production.

These results referring to a less effect of narrow variation between locations under controlled environments.

Regarding to the tables (6,9), in both grand and parent lines the advantage in hen-daily hatching egg production achieved by Hypeco breed. However, this superiority of Hypeco can be relating to the projects efficiency and successful management programs. On the other hand, Avian breed achieved better performance in hen daily hatching egg production in grand parent lines, whereas, the two breeds were performed equally in parent lines which had less environmental control. This result indicates that there were differences in genetic background and selection strategies between breeds. This is in agreement with the finding of Barbour *et al.* (1996) and Abiola, *et al.* (2003) who find differences between breeds in hatchability percent .

The differences which observed between flocks in hen-daily hatching egg production in both grand and parent lines might be due to the daily practices, and flock conditions. Due to the differences in selection goals, the lines which had lower body weight in rearing period exhibit higher hen-daily hatching egg production percent. In general, female lines may achieved higher hen-daily hatching egg production due to their tendencies to reproductive more than production and contrarily in male lines Emmerson (1997).

The differences between months in hen-daily hatching egg production were observed in grand parent lines only as explained in figure (26). The response of the breeds was similarly to that observed in hen-daily egg production due to the tight association between to traits.

The effect of years in hen-daily hatching egg production of grand parent lines was similar to that recorded in hen-daily egg production as indicated in figure (27). But in parent lines, first years (Hypeco breed period) showed ascending increase in hen-daily hatching egg production, whereas, later periods exhibited fluctuating rates according the different years. These observations give a signal to that hen-daily hatching production affected more with management processes than those in daily egg production.

2 . 3. Cumulative mortality percent :

The differences between projects in cumulative mortality percent were absent in grand parent lines, but they were high in parent lines, so these differences can be relate to the variation of two regions conditions. That is because the effect of climate factors can be appear in parent lines which had lower control of housing environment than those in grand parent lines. This is in agreement with the recommendation of Ramirez, *et al.* (2005).

The differences between breeds in cumulative mortality percent refer to the differences in selection process, that's because the breed which had higher mortality in grand parent recorded higher survival in parent lines. These results in agreement to the finding of Barbour *et al.* (1996) and Custodio *et al.* (1997). Likewise, this difference might be due to the variation in the adaptability of breeds to different regimes of management. The differences between lines in cumulative mortality percent can be relate to the differences in live body weight which was high in male lines during rearing period in comparing with female lines.

There were some variations in breeds response to the different months of the year. In both lines its appear that Shaver breed more comfortable in hot months, but it was affected more during hot-humid (In the end of summer) months. Conversely, Avian breed exhibit more mortality during hot months (summer season) as regarding in figures (30,61). But Hypeco breed appeared similarly response to Shaver in parents and exhibit more mortality in hot months in grand parents. However, this regime of differences referring to a variation between breeds in a average body weight, genetic background, and selection strategies.

As recorded in figure (30), mortality percent in grand parent lines had ascending trend a cross years during first years when Hypeco breed was used, but in the later years the trend were nearly to stable. This trend may occur due to the differences between breeds in adaptation degree. On the other hand, Hypeco breed exhibit same trend of mortality in parent lines, whereas, Avian breed had ascending trend, but Shaver breed had nearly stable trend as explained in figure (62). This trend of variation refer to the poor adaptation of Avian breed, good adaptation of Hypeco, and high genetic stability of Shaver breed in viability trait. However, this variation might be due to differences in genetic background and selection history. Same results were obtained when local stocks compared with commercial stocks Yalcin, *et al.* (2001).

Conclusions

- From the finding of this study it can be concluded that the locations exhibit low difference in the rearing period, but their sever effects were appeared in production periods in both grandparents and parents. So, better results can be obtained by the different commercial breeds under local conditions by more control of housing environments, specially in production periods. In general, all breeds performed well and satisfactory in Libyan costal regions.
- The differences which exhibited between the breeds in all studied traits indicate that the genetic and selection histories are different. However, Hypeco breed seems to be superior to Avian and Shaver could be grown and uniformly under Libyan conditions.
- The breeds exhibited different responses to the different seasons in Libya. The more sever effect was observed during the hot-humid months (August and September) specially under low efficiency of conditioning equipments. However, the effect of different months depends mainly on the management program, So, good results were obtained by Hypeco breed in the different months.
- The differences in the performance of different breeds during the different years reflex the importance of the effect of management program. However, the performance of the breeds declined with elapsing years as the projects efficiency declined. In general, Shaver breed exhibited good adaptability in some traits in comparing to the other breeds.
- By improve the management programs good results can be obtained by Avian an Shaver breeds which appeared good indicators in hatchability and adaptability respectively.

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Appendix

Table.1 Daily feed consumption per bird (GP R. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	597.323	1158	1130.881	0.528	0.4675
{2}BREED	*Fixed	2	12857.617	1158	1130.881	11.370	0.0000
{3}FLOCK	*Fixed	14	3005.058	1158	1130.881	2.657	0.0008
{4}LINE	*Fixed	1	16996.262	1158	1130.881	15.029	0.0001
{5}SEX	Fixed	2	16382.308	1158	1130.881	14.486	0.0000
{6}MONTH	Fixed	11	1428.144	1158	1130.881	1.263	0.2407
{7}YEAR	Fixed	4	3040.682	1158	1130.881	2.689	0.0300
{8}SEL_STAG	Fixed	2	32466.943	28	3360.692	9.661	0.0006
{9}AGE	Random	19	6026.125	1158	1130.881	5.329	0.0000

Table.2 Cumulative feed consumption per bird (GP R. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	56.510	1158	17.968	3.145	0.0764
{2}BREED	*Fixed	2	301.767	1158	17.968	16.794	0.0000
{3}FLOCK	*Fixed	14	235.686	1158	17.968	13.117	0.0000
{4}LINE	*Fixed	1	7563.967	1158	17.968	420.963	0.0000
{5}SEX	Fixed	2	9836.735	1158	17.968	547.451	0.0000
{6}MONTH	Fixed	11	27.459	1158	17.968	1.528	0.1154
{7}YEAR	Fixed	4	160.000	1158	17.968	8.905	0.0000
{8}SEL_STAG	Fixed	2	805.693	26	61.301	13.143	0.0001
{9}AGE	Random	19	113.100	1158	17.968	6.294	0.0000

Table.3 Bird housed feed consumption (GP R. Period):

Source of var.	Effect (F/R)	Df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	0.003	1158	2.394	0.001	0.9719
{2}BREED	*Fixed	2	23.906	1158	2.394	9.986	0.0001
{3}FLOCK	*Fixed	14	52.000	1158	2.394	21.722	0.0000
{4}LINE	*Fixed	1	5.099	1158	2.394	2.130	0.1447
{5}SEX	Fixed	2	74.915	1158	2.394	31.294	0.0000
{6}MONTH	Fixed	11	3.861	1158	2.394	1.613	0.0894
{7}YEAR	Fixed	4	2.145	1158	2.394	0.896	0.4655
{8}SEL_STAG	Fixed	2	104.326	26	8.685	12.013	0.0002
{9}AGE	Random	19	16.205	1158	2.394	6.769	0.0000

Table.4 Live body weight (GP R. Period):

Source of var.	Effect (F/R)	Df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	45096.60	1158	42327.68	1.07	0.3022
{2}BREED	*Fixed	2	3558566.10	1158	42327.68	84.07	0.0000
{3}FLOCK	*Fixed	14	442245.96	1158	42327.68	10.45	0.0000
{4}LINE	*Fixed	1	14619366.17	1158	42327.68	345.39	0.0000
{5}SEX	Fixed	2	25296234.29	1158	42327.68	597.63	0.0000
{6}MONTH	Fixed	11	221754.09	1158	42327.68	5.24	0.0000
{7}YEAR	Fixed	4	25758.79	1158	42327.68	0.61	0.6565
{8}SEL. STAG	Fixed	2	14968575.47	20	864801.55	17.31	0.0000
{9}AGE	Random	19	1847956.57	1158	42327.68	43.66	0.0000

Table.5 Cumulative mortality percent (GP R. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	712.359	1158	35.719	19.943	0.0000
{2}BREED	*Fixed	2	1491.603	1158	35.719	41.759	0.0000
{3}FLOCK	*Fixed	14	2796.516	1158	35.719	78.292	0.0000
{4}LINE	*Fixed	1	179.969	1158	35.719	5.038	0.0250
{5}SEX	Fixed	2	2492.957	1158	35.719	69.793	0.0000
{6}MONTH	Fixed	11	29.328	1158	35.719	0.821	0.6190
{7}YEAR	Fixed	4	36.561	1158	35.719	1.024	0.3939
{8}SEL. STAG	Fixed	2	139.420	240.05929	26.465	5.268	0.0058
{9}AGE	Random	19	15.403	1158	35.719	0.431	0.9843

Table.6 Daily feed consumption per bird (GP P. Period):

Source of var.	Effect (F/R)	Df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	10257.798	1292	213.885	47.959	0.0000
{2}BREED	*Fixed	2	4396.031	1292	213.885	20.553	0.0000
{3}FLOCK	*Fixed	14	2254.490	1292	213.885	10.541	0.0000
{4}LINE	Fixed	1	2827.399	1292	213.885	13.219	0.0003
{5}MONTH	*Fixed	11	2202.535	320	299.048	7.365	0.0000
{6}YEAR	Fixed	9	2099.718	100	463.984	4.525	0.0001
{7}AGE	Random	37	1944.572	1292	213.885	9.092	0.0000

Table.7 Hen housed feed consumption (GP P. Period):

Source of var.	Effect (F/R)	Df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	2.686	1247	0.830	3.235	0.0723
{2}BREED	*Fixed	2	47.397	1247	0.830	57.096	0.0000
{3}FLOCK	Fixed	14	72.541	1247	0.830	87.385	0.0000
{4}LINE	Fixed	1	4.922	1247	0.830	5.929	0.0150
{5}MONTH	Fixed	11	2.368	1247	0.830	2.853	0.0011
{6}YEAR	Fixed	9	14.561	1247	0.830	17.541	0.0000
{7}AGE	Random	37	75.917	1247	0.830	91.452	0.0000

Table.8 Hen housed egg production (GP P. Period):

Source of var.	Effect (F/R)	Df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	13.068	1247	36.729	0.356	0.5510
{2}BREED	*Fixed	2	358.903	1247	36.729	9.772	0.0001
{3}FLOCK	Fixed	14	3700.301	1247	36.729	100.745	0.0000
{4}LINE	Fixed	1	55122.336	1247	36.729	1500.775	0.0000
{5}MONTH	Fixed	11	147.361	1247	36.729	4.012	0.0000
{6}YEAR	Fixed	9	650.981	1247	36.729	17.724	0.0000
{7}AGE	Random	37	1107.576	1247	36.729	30.155	0.0000

Table.9 Hen housed hatching egg production (GP P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	58.712	1247	27.581	2.129	0.1448
{2}BREED	*Fixed	2	689.187	1247	27.581	24.988	0.0000
{3}FLOCK	Fixed	14	1967.534	1247	27.581	71.337	0.0000
{4}LINE	Fixed	1	40011.441	1247	27.581	1450.696	0.0000
{5}MONTH	Fixed	11	85.532	1247	27.581	3.101	0.0004
{6}YEAR	Fixed	9	372.062	1247	27.581	13.490	0.0000
{7}AGE	Random	37	741.819	1247	27.581	26.896	0.0000

Table.10 Percentage of hen daily egg prod.(GP. P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	87.794	1247	55.888	1.571	0.2103
{2}BREED	*Fixed	2	1386.962	1247	55.888	24.817	0.0000
{3}FLOCK	Fixed	14	1318.250	1247	55.888	23.587	0.0000
{4}LINE	Fixed	1	33703.419	1247	55.888	603.056	0.0000
{5}MONTH	Fixed	11	548.763	1247	55.888	9.819	0.0000
{6}YEAR	Fixed	9	926.090	1247	55.888	16.571	0.0000
{7}AGE	Random	37	6860.593	1247	55.888	122.757	0.0000

Table.11 Percentage of hen daily hatch. egg prod.(GP. P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	187.005	1247	73.864	2.532	0.1118
{2}BREED	*Fixed	2	820.695	1247	73.864	11.111	0.0000
{3}FLOCK	Fixed	14	1275.577	1247	73.864	17.269	0.0000
{4}LINE	Fixed	1	26044.621	1247	73.864	352.602	0.0000
{5}MONTH	Fixed	11	500.340	1247	73.864	6.774	0.0000
{6}YEAR	Fixed	9	950.627	1247	73.864	12.870	0.0000
{7}AGE	Random	37	7871.901	1247	73.864	106.573	0.0000

Table.12 Cumulative mortality percent (GP P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	0.105	1247	4.391	0.024	0.8771
{2}BREED	*Fixed	2	73.772	1247	4.391	16.802	0.0000
{3}FLOCK	Fixed	14	232.169	1247	4.391	52.877	0.0000
{4}LINE	Fixed	1	2149.598	1247	4.391	489.579	0.0000
{5}MONTH	Fixed	11	36.334	1247	4.391	8.275	0.0000
{6}YEAR	Fixed	9	20.954	1247	4.391	4.772	0.0000
{7}AGE	Random	37	9.765	1247	4.391	2.224	0.0000

Table.13 Daily feed consumption per bird (P. R. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	312.60	3986	238.54	1.31	0.2524
{2}BREED	*Fixed	2	13508.01	3986	238.54	56.63	0.0000
{3}G_P_FLOC	*Fixed	14	3180.24	3986	238.54	13.33	0.0000
{4}P_FLOCK	Fixed	36	1339.87	3986	238.54	5.62	0.0000
{5}HOUSE	Fixed	1	240.51	3986	238.54	1.01	0.3154
{6}SEX	Fixed	1	255618.19	3986	238.54	1071.58	0.0000
{7}MONTH	Fixed	11	642.14	3986	238.54	2.69	0.0019
{8}YEAR	Fixed	7	1085.27	3986	238.54	4.55	0.0000
{9}AGE	Random	21	7759.03	3986	238.54	32.53	0.0000

Table.14 Cumulative feed consumption per bird (P. R. Period).

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	34.770	3986	10.934	3.180	0.0746
{2}BREED	*Fixed	2	144.923	3986	10.934	13.254	0.0000
{3}G_P_FLOC	*Fixed	14	113.956	3986	10.934	10.422	0.0000
{4}P_FLOCK	Fixed	36	124.350	3986	10.934	11.373	0.0000
{5}HOUSE	Fixed	1	22.301	3986	10.934	2.040	0.1533
{6}SEX	Fixed	1	6324.039	3986	10.934	578.370	0.0000
{7}MONTH	Fixed	11	29.643	3986	10.934	2.711	0.0017
{8}YEAR	Fixed	7	46.819	3986	10.934	4.282	0.0001
{9}AGE	Random	21	219.308	3986	10.934	20.057	0.0000

Table.15 Birds housed feed consumption (P. R. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	17.721	3986	6.590	2.689	0.1011
{2}BREED	*Fixed	2	341.613	3986	6.590	51.839	0.0000
{3}G_P_FLOC	*Fixed	14	73.080	3986	6.590	11.090	0.0000
{4}P_FLOCK	Fixed	36	111.944	3986	6.590	16.987	0.0000
{5}HOUSE	Fixed	1	19.944	3986	6.590	3.026	0.0820
{6}SEX	Fixed	1	282.084	3986	6.590	42.806	0.0000
{7}MONTH	Fixed	11	10.978	3986	6.590	1.666	0.0748
{8}YEAR	Fixed	7	18.508	3986	6.590	2.808	0.0064
{9}AGE	Random	21	68.282	3986	6.590	10.362	0.0000

Table.16 Live body weight (P. R. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	435602	3986	33460.90	13.018	0.0003
{2}BREED	*Fixed	2	908994	3986	33460.90	27.166	0.0000
{3}G_P_FLOC	*Fixed	14	332955	3986	33460.90	9.951	0.0000
{4}P_FLOCK	Fixed	36	297086	3986	33460.90	8.879	0.0000
{5}HOUSE	Fixed	1	3881	3986	33460.90	0.116	0.7334
{6}SEX	Fixed	1	208735404	3986	33460.90	6238.188	0.0000
{7}MONTH	Fixed	11	51850	3986	33460.90	1.550	0.1070
{8}YEAR	Fixed	7	198663	3986	33460.90	5.937	0.0000
{9}AGE	Random	21	4229676	3986	33460.90	126.407	0.0000

Table.17 Cumulative mortality percent (P. R. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	71.605	3986	89.938	0.796	0.3723
{2}BREED	*Fixed	2	1027.512	3986	89.938	11.425	0.0000
{3}G_P_FLOC	*Fixed	14	1785.134	3986	89.938	19.849	0.0000
{4}P_FLOCK	Fixed	36	979.518	3986	89.938	10.891	0.0000
{5}HOUSE	Fixed	1	71.643	3986	89.938	0.797	0.3722
{6}SEX	Fixed	1	125573.646	3986	89.938	1396.226	0.0000
{7}MONTH	Fixed	11	319.479	3986	89.938	3.552	0.0001
{8}YEAR	Fixed	7	522.358	3986	89.938	5.808	0.0000
{9}AGE	Random	21	688.342	3986	89.938	7.654	0.0000

Table.18 Bird daily feed consumption (P. P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	1584.17	1825	69.75	22.71	0.0000
{2}BREED	*Fixed	2	12343.10	1825	69.75	176.97	0.0000
{3}G_P_FLOC	*Fixed	14	985.22	1825	69.75	14.13	0.0000
{4}P_FLOCK	Fixed	36	251.04	1825	69.75	3.60	0.0000
{5}MONTH	Fixed	11	534.92	1825	69.75	7.67	0.0000
{6}YEAR	Fixed	10	233.75	1825	69.75	3.35	0.0002
{7}AGE	Random	37	1195.31	1825	69.75	17.14	0.0000

Table.19 Hen housed feed consumption (P. P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	96.053	1825	0.439	218.934	0.0000
{2}BREED	*Fixed	2	21.897	1825	0.439	49.909	0.0000
{3}G_P_FLOC	*Fixed	14	50.460	1825	0.439	115.014	0.0000
{4}P_FLOCK	Fixed	36	11.820	1825	0.439	26.942	0.0000
{5}MONTH	Fixed	11	9.912	1825	0.439	22.593	0.0000
{6}YEAR	Fixed	10	21.711	1825	0.439	49.485	0.0000
{7}AGE	Random	37	297.485	1825	0.439	678.061	0.0000

Table.20 Hen housed egg production (P. P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	36.874	1825	8.610	4.283	0.0386
{2}BREED	*Fixed	2	2752.709	1825	8.610	319.716	0.0000
{3}G_P_FLOC	*Fixed	14	860.890	1825	8.610	99.989	0.0000
{4}P_FLOCK	Fixed	36	744.319	1825	8.610	86.450	0.0000
{5}MONTH	Fixed	11	136.942	1825	8.610	15.905	0.0000
{6}YEAR	Fixed	10	342.145	1825	8.610	39.739	0.0000
{7}AGE	Random	37	4292.516	1825	8.610	498.559	0.0000

Table.21 Hen-housed hatching egg production (P. P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	255.110	1825	23.485	10.863	0.0010
{2}BREED	*Fixed	2	1927.920	1825	23.485	82.093	0.0000
{3}G_P_FLOC	*Fixed	14	2759.639	1825	23.485	117.508	0.0000
{4}P_FLOCK	Fixed	36	1530.468	1825	23.485	65.169	0.0000
{5}MONTH	Fixed	11	210.055	1825	23.485	8.944	0.0000
{6}YEAR	Fixed	10	383.017	1825	23.485	16.309	0.0000
{7}AGE	Random	37	3611.845	1825	23.485	153.796	0.0000

Table.22 Percentage of hen daily egg production (P. P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	63.463	1825	28.649	2.215	0.1368
{2}BREED	*Fixed	2	623.972	1825	28.649	21.780	0.0000
{3}G_P_FLOC	*Fixed	14	613.690	1825	28.649	21.421	0.0000
{4}P_FLOCK	Fixed	36	232.994	1825	28.649	8.133	0.0000
{5}MONTH	Fixed	11	266.265	1825	28.649	9.294	0.0000
{6}YEAR	Fixed	10	482.732	1825	28.649	16.850	0.0000
{7}AGE	Random	37	8643.246	1825	28.649	301.693	0.0000

Table.23 Percentage of hen daily hatch. egg prod. (P. P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	221.674	1825	242.008	0.916	0.3387
{2}BREED	*Fixed	2	1063.572	1825	242.008	4.395	0.0125
{3}G_P_FLOC	*Fixed	14	2167.743	1825	242.008	8.957	0.0000
{4}P_FLOCK	Fixed	36	803.663	1825	242.008	3.321	0.0000
{5}MONTH	Fixed	11	276.440	1825	242.008	1.142	0.3236
{6}YEAR	Fixed	10	569.854	1825	242.008	2.355	0.0092
{7}AGE	Random	37	11625.007	1825	242.008	48.036	0.0000

Table.24 Percentage of cumulative mortality (P. P. Period):

Source of var.	Effect (F/R)	df Effect	MS Effect	df Error	MS Error	F	p
{1}PROJECT	*Fixed	1	38.534	1825	2.332	16.523	0.0001
{2}BREED	*Fixed	2	743.266	1825	2.332	318.697	0.0000
{3}G_P_FLOC	*Fixed	14	302.574	1825	2.332	129.738	0.0000
{4}P_FLOCK	Fixed	36	114.519	1825	2.332	49.103	0.0000
{5}MONTH	Fixed	11	83.863	1825	2.332	35.959	0.0000
{6}YEAR	Fixed	10	26.732	1825	2.332	11.462	0.0000
{7}AGE	Random	37	18.804	1825	2.332	8.063	0.0000

الملخص باللغة العربية

يعتبر استخدام السلالات التجارية لإنتاج اللحم في ليبيا من العوامل التي قد تؤدي إلى خسائر اقتصادية في الإنتاج لأن هذه السلالات منتخبة لغرض الإنتاج تحت ظروف المناطق المعتدلة وبالتالي يمكن أن تستجيب بصورة مختلفة لظروف المنطقة المحلية. ولهذا الغرض استهدفت هذه الدراسة تقييم خطوط الجدود و الأمهات لثلاث سلالات تجارية (**Hypeco – Avian - Shaver**) استخدمت في المناطق الساحلية للجماهيرية خلال مواسم وسنوات متعددة وذلك من خلال معدل الأداء بالنسبة للصفات المدروسة و التي تتمثل في صفات الغذاء و صفات انتاج البيض و نسبة النفوق التراكمي.

البيانات المستخدمة في الدراسة تم تجميعها من واقع السجلات الأسبوعية لثلاث قطعان من خطوط الجدود وثلاث قطعان لنسل كل قطيع من هذه القطعان في خطوط الأمهات من كل سلالة بمشروعين لإنتاج الدواجن بالجماهيرية (غوط سلطان، تاورغاء) ،وتمثل مجتمع الدراسة في حوالي 1.271.152 طائر وصل من بينها حوالي 697.622 طائر إلى مرحلة النضج الجنسي ودخلت مرحلة الإنتاج في كل من خطوط الجدود و الأمهات.

أخضعت البيانات للتحليل الإحصائي وكانت النتائج المتحصل عليها تشير إلى أن الفروق المعنوية بين المشروعين (الموقعين) في الصفات المدروسة أعلى في مرحلة الإنتاج عنه في مرحلة التنشئة خاصة في خطوط الأمهات، كما أن الفروق بين السلالات كانت عالية المعنوية في جميع الصفات المدروسة حيث أعطت سلالة ال Hypeco أفضل معدل أداء مقارنة بالسلالات الأخرى. كما اختلف أداء السلالات باختلاف أشهر السنة مما يشير إلى اختلاف استجابة هذه السلالات تبعا للفصول المختلفة، وكذلك اختلفت السلالات في أدائها عبر السنوات المختلفة مما يشير إلى أثر العوامل البيئية و الإدارية المختلفة في معدلات الأداء.

جامعة التحدي
كلية الزراعة
قسم الإنتاج الحيواني

تقييم خطوط الجدود والأمهات لسلالات دواجن لحم تجارية بمشروعي غوط السلطان وتاورغاء

مقدمة من الطالب

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قدمت هذه الإطروحة استكمالا لمتطلبات الإجازة العالية (الماجستير)

في الإنتاج الحيواني

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