PRODUCTIVITY OF AUSTRALORP CHICKENS IN PAPUA NEW GUINEA

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ABSTRACT

Australorp chickens as a pure breed and in crossbreeding systems are important in the development of appropriate egg production systems in Papua New Guinea. However, problems exist with the economic disposal of surplus male birds and there is little comparative data on egg production with birds on commercial diets. The work described in this paper was firstly an attempt to assess the utility of raising surplus male chicks on commercial broiler feeds and secondly to gather limited data on egg production by *Australorps* in comparison with commercial hybrid layer birds. The results show clearly that it would be uneconomic to try to rear *Australorp* males on broiler feeds but that egg production by *Australorps* can be economic in spite of a longer time to point of first lay and a later attainment of peak production compared to commercial hybrids. Also presented is a summary of work done in Papua New Guinea to assess the utility of crossbreeding *Australorps* with commercial hybrid layers to produce a more accessible and cheaper alternative to the commercial hybrids for smallholder farmers. Suggestions are made as to options for the future use of the *Australorp* breed in Papua New Guinea.

Key words: Australorps, egg production, crossbreeding, birds, hybrid layers,

INTRODUCTION

Rural households and smallholder farmers in Papua New Guinea (PNG) keep chickens or ducks for meat and eggs with higher proportions of owners in the coastal provinces compared with limited traditional poultry keeping in the highlands provinces. However, increasing numbers of farmers are entering into commercial small-scale production, especially of broiler chickens (Bourke and Harwood 2009). The PNG literature on village poultry has been reviewed by Quartermain (2000). Since 1964 there have been ongoing attempts to improve household poultry meat and egg production in rural areas by the distribution of birds of introduced breeds, mainly Australorp chickens and Muscovy ducks, and through some husbandry improvement suggestions (see Quartermain 2000). Australorps were chosen either to replace village chickens or to crossbreed with them to produce a more productive bird. However, such birds cannot be relied upon to sit on eggs and hatch them as required. There are also problems of sustainability of breeding flocks and provision of adequate feeding and management. In order to further assess the utility of the Australorp breed in emerging small-scale commercial production systems, research has been done to characterize the productivity of the breed under commercial conditions and to assess the possibilities in crossbreeding Australorps with commercial hybrid layer strains to produce a cheaper, perhaps hardier, but certainly a more accessible alternative to the available commercial birds. In such situations, use must be found for the large numbers of surplus males and there is little information available on the feed requirements, growth potential and time to slaughter or sale of live male Australorp chickens. Hence, a feeding trial with male Australorps was conducted as well as productivity assessment of the several alternative genotypes for egg production.

1. Growth of Male Australorps on Commercial Broiler Feeds

Management and data collection

This work was undertaken at the Labu lowland

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livestock research centre of the PNG National Agricultural Research Institute (NARI). Male Australorps and mixed-sex commercial hybrid broiler chickens (Ross strain) were compared with 18 birds of each type in a completely randomized trial with three replicates per strain and 6 birds per replicate. The birds were fed commercial starter for the first four weeks and finisher for the next four weeks but were allocated into six 2.5 m^2 pens at three weeks of age (the earliest Australorps could be sexed). Live weights and feed intake were measured weekly from four to eight weeks and compared by 't' test. Subsequently, the Australorp males, because they were only 25 percent of the size of the broilers at this time, were kept for six more weeks with continued weekly measurement of live weights and feed intakes.

RESULTS

Live Weights and Gains

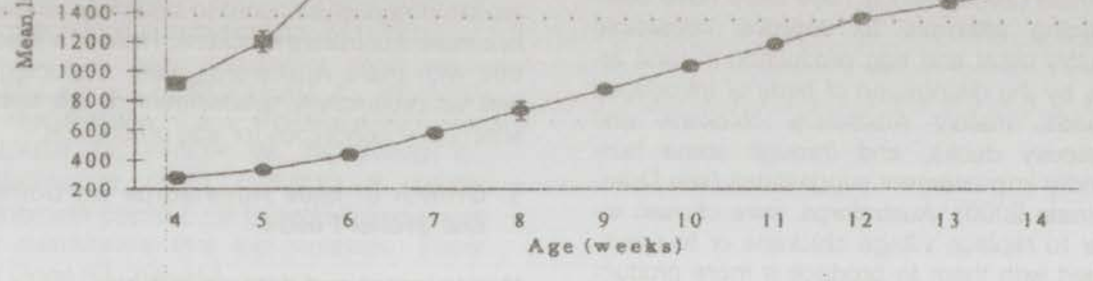
The mean live weights of the two strains of chicken are shown in Figure 1. The male Australorps had significantly lower weights ($P<0.01$) compared to the mixed-sex broilers throughout the trial and by the end of the eight weeks their mean live weight was only 25 percent of the mean live weight of the broilers (730 v. 2934 g). Average daily gains from four to eight weeks were 16 and 72 g for the Australorps and broilers respectively. The mean weights of the Australorp males from eight to 14 weeks, also shown in Figure 1, indicate a continued slow growth (28g/day) and, although they had doubled in size by the end of 14 weeks, their mean 14-week weight (1589 g) was still only 54 percent the weight of the broilers at eight weeks .

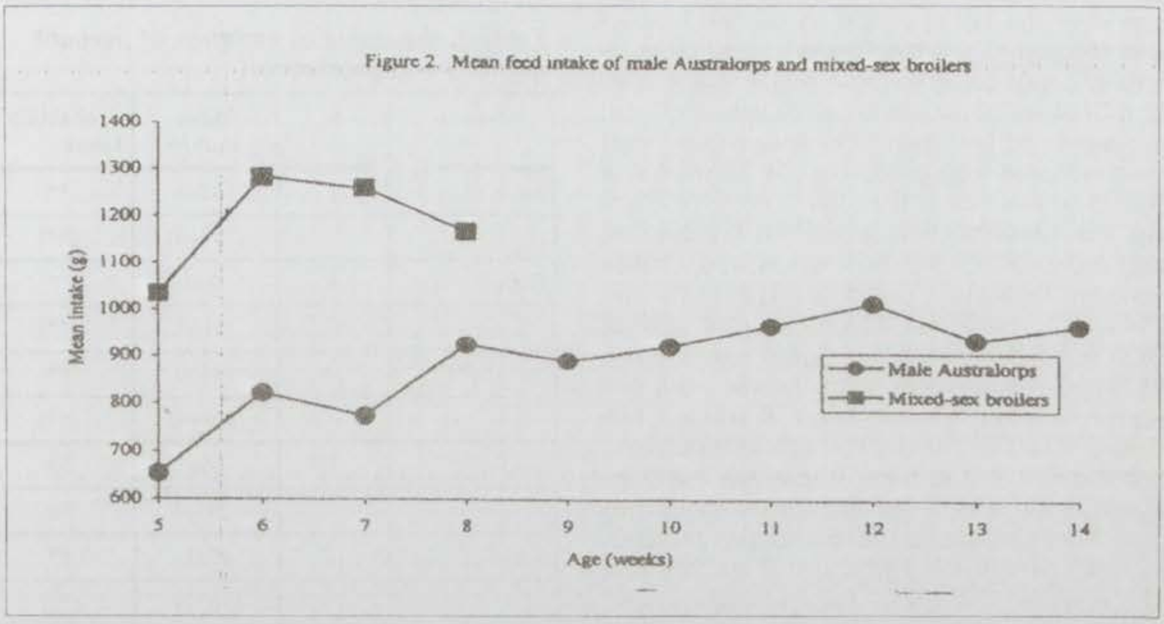
Feed Intakes and Feed Conversion Ratios (FCR)

The estimated mean feed intake per bird per week (Figure 2) indicates that the male Australorps had significantly lower intakes ($P<0.01$) at 5, 6, 7 and 8 weeks compared to the mixed-sex broilers. The mean intake of the Australorps from 9-14 weeks of age was 917 g per bird per week but there was some feed spillage affecting this estimate.

The broilers were significantly more efficient ($P<0.01$) in converting feed to body weight gain compared to the Australorps, the overall mean FCR from four to eight weeks being 5.7

Figure 1. Mean live weights of male Australorps and mixed-sex broilers





and 2.7 units of feed per unit of gain for the Australorps and broilers respectively. The mean FCR for the Australorps from 9-14 weeks of age was about six units of feed to one unit of gain.

CONCLUSION

As expected, the results of this trial showed that male Australorps grow much more slowly than commercial hybrid broilers. As a pure breed, the Australorps do not possess the same mix of genes required for efficient conversion of feed to meat and therefore cost more to produce than commercial broilers. Feeding Australorps on expensive commercial feed is obviously uneconomic. The Institute is conducting ongoing research to devise a more appropriate lower intensity feeding system, based on locally available resources, to enable farmers to make effective use of surplus male birds from Australorp layer production systems.

2. Egg Production of Australorps, Comercial Hybrids and their Crosses

MATERIALS AND METHODS

A preliminary trial at NARI Labu comparing the egg production potentials of Australorp and Shaver Brown hybrid layer chickens was started at the end of 2001 and ended in March 2003. One batch of 52 Shaver Brown pullets was purchased from Zenag while a batch of 50 Australorp chicks was hatched at the Labu center. Unfortunately, because of the small number of Australorp females available from the hatch, a total of only 20 birds, 10 of each of the two strains, were used in the trial. The birds were raised separately until point of lay then weighed and the mean live weight balanced between two replicates of each strain, 1387.2g and 1389.8g for Australorps and 1400.6g and 1397.0g for Shavers. The five hens in each replicate were kept in a 2.5 x 2.5 m room in a standard chicken house with iron roof and concrete floor with deep litter. Commercial layer feed and water were provided *ad libitum* and eggs were collected and recorded twice daily. The percent egg production per month over the 13 month period (30-day months) and the live weights of hens that survived to the end of the trial were analyzed using a completely randomized design to assess strain differences and determine whether Shaver production would be economically viable given the high cost of their replacement. Because the Shavers came into lay and therefore reached peak production earlier than the Australorps, the Australorp data were adjusted so that either point of lay or peak production were at the same time for both strains. Hence, two separate analyses of variance were done to compare egg production with either 13 or 11 months of data available for the two analyses of variance. Feed intake was estimated only during one week in the 10th month of lay.

RESULTS

The primary interest in this trial was to identify any important strain differences in egg production over the laying period. A second interest was to determine if the Shavers could produce enough eggs to offset their replacement cost. The Shavers came into lay at 15 weeks of age, 4 weeks earlier than the Australorps, and reached peak egg production at 22 weeks of age, 5 weeks earlier than the Austalorps. During the 13-month trial period the numbers of egg produced by the Australorps and Shaver hens in replicates 1 and 2 were 1485 and 1146, and 1458 and 1743; giving a total of 2631 and 3201 for the two strains respectively. At K0.30 per egg, the gross income from this would be K789.30 and K960.30 for the two strains. The five Australorp hens in replicate 1 and the five Shaver hens in replicate 2 all survived to the end of the trial so for these two groups egg production per hen during the 390-day trial period was 297 and 349 (or 274 and 322 eggs in 360 days). Two Australorp hens died in replicate 2 and three Shaver hens died in replicate 1, giving a mortality rate of 20 and 30 percent for the two strains. The deaths were unfortunate, as they further reduced the already small number of birds and perhaps therefore affected the results of the trial.

Analysis assuming the same time at point of lay

This first analysis of variance of percent egg production per month (Table 1, figures not in parenthesis), showed that strain, month, replicate and all interactions except strain x replication had significant effects (P<0.01). However, the means are not presented nor discussed as such because the small effects, although significant, cannot be regarded as reliable. Strain was the most important effect followed by month, but across all 13 months the Shavers produced 11.5 percent more eggs compared to the Australorps (85.0 +/- 0.64 v 73.5 +/- 0.64 percent). The strain x month interaction as illustrated in Figure 3 indicates that egg production was significantly higher (P<0.01) for the Shavers than the Australorps only in the 1st month (74 v 26 percent), 2nd month (98 v 75 percent), 8th month (91 v 78 percent), and 12th and 13th months of the trial (67 v 55 and 75 v 44 percent). In eight out of the 13 months of the trial, egg production did not differ significantly between the two strains, although it was always higher for the Shavers. On a weekly basis the data show some instances in which the Australorps had the same or higher production level than the Shavers, and a few of the cases where the Australorp production was higher and the differences were significant.

Table 1. Analysis of variance of percent monthly egg production

Source	df	Mean square	Probability Level
Strain (S)	1	55746	**
		(31465)	(**)
Reps ®	1	6241	**
		(7160	(**)
Month (M)	12	25600	**
	(10)	(20144)	(**)
S x R	1	166	Ns
		(44)	Ns
S x M	12	5958	**
	(10)	(1627)	(**)
S x R x M	12	1028	**
	(10)	(1140)	(**)
R^2 (%)		50(45)	(**)

Analysis assuming the same time at peak production

This analysis of variance of percent egg production per month (Table 1, figures in parenthesis), gave similar results to the first analysis. Strain means, although dependent on month, again showed a higher production from Shavers than from Australorps by nine percent during the 11-month period (87 +/- 0.64 v 78 +/ - 0.64 percent). Replicate means and interaction effects are not presented nor discussed for the same reasons given earlier. The strain x month interaction for the 11 months of trial (Figure 4) shows many more months in which significant differences appear between the strains compared to the first analysis. The significant differences occurred in the 3rd, 5th, 6th, 7th, 8th, 10th, and 11th months; only in 4 of the months were the two strains similar in egg production. Thus, the comparison assuming the same time at peak egg production actually increased rather than reduced strain differences as might have been anticipated.

Costs and Returns

Live weights of the surviving hens from the two replicates were combined for each strain and the mean weights were 2098.5 +/- 96.50 and 1893.3 +/- 103.16 g for the 8 Australorps and 7

Figure 3. Mean monthly egg production (%) assuming the same time at point of lay for both strains

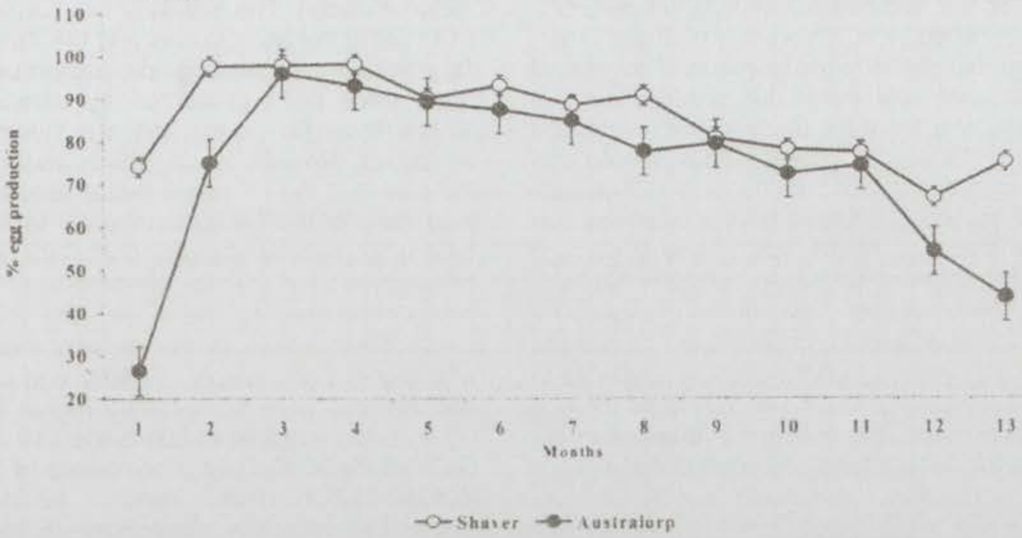
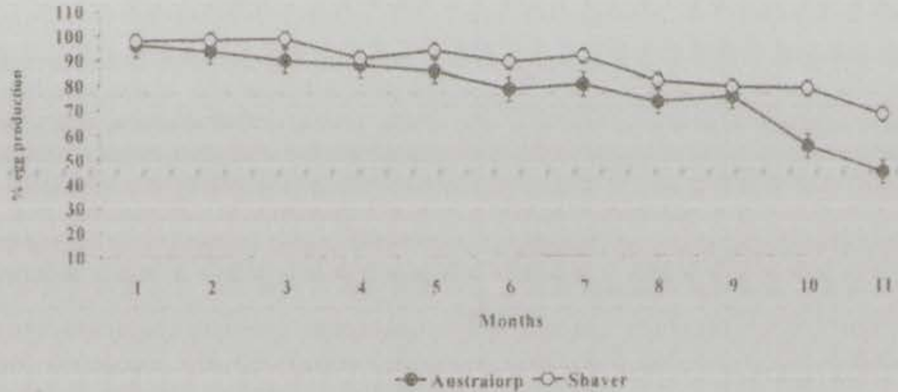


Figure 4. Mean monthly egg production (%) assuming the same time at peak production for both strains



Shavers, the difference being non-significant. The hens were valued at the time at K10.00 each for the purposes of the financial analysis.

Daily feed consumption per hen estimated during one week in the 10th month after start of laying averaged 105 +/- 5.0 g. Over the 13-months (all 30-day months) of the trial total feed consumed per hen would be around 41kg costing K52.00 based feed prices at that time.

Estimates of net income per bird for the two strains (Table 2) suggest a K12.57 advantage in favour of the Shavers, due mainly to their superior egg production potential. The estimates do not include capital infrastructure, management, water, electricity or other costs that might have been incurred.

DISCUSSION AND CONCLUSIONS

The Shaver hens had a higher mean egg production per month throughout the trial period and after reaching peak production maintained an average of over 90 percent lay for the next six months, whilst the Australorps maintained an average of over 90 percent for only four months after peak production. Production up to the 11th month of the trial averaged 87 and 83 percent for the Shavers and Australorps but, as expected, declined after that and averaged 71 and 50 percent in the last two months of the trial, the decline being more rapid for the Australorps. It might still be profitable to keep the Shavers for these extra months but not the Australorps. The results suggest that Australorps can produce eggs at an economic level for up to about 11 months from start of laying, whereas Shavers can produce eggs for a few months longer. The estimated net income from Shavers at prices current at the time of the trial (Table 2) is high enough to allow a farmer to purchase replacement Shaver pullets and still have surplus income for other uses. It is concluded from these preliminary results that it would be profitable to keep Australorp and Shaver chickens for egg production but care should be taken with regard to the cost of feed and price of eggs.

Table 2. Estimates of net income per bird

Item	Australorp	Shaver
Costs of one day-old chick (Kina)	1.20	4.23
Amount of feed consumed to point of lay (kg)	7.4	7.4
Cost of feed consumed to point of lay (K)	9.35	9.35
Amount of feed consumed during trial (kg)	41	41
Cost of feed consumed during trial (K)	52.00	52.00
Total Cost (K)	**62.55**	**65.58**
Revenue		
Number of eggs laid	297	349
Income from egg sales (K0.30 per egg)	89.10	104.70
Income from one culled hen (K)	10.00	10.00
Total Income (K)	**99.10**	**114.70**
Net Income (Total Income—Total Cost) (K)	**36.55**	**49.12**

An alternative approach is to explore the utility of crossbreeding between Australorps and commercial egg production lines such as the Shavers. An experiment was conducted at the PNG University of Natural Resources and Environment with the objective of producing a crossbred egg-laying chicken for smallholder village poultry production in PNG. The exotic chicken breed used was the Shaver Brown (SB) as the dam line and the introduced purebred Australorp (A) as the sire line. Both F_1 crosses (AxSB) and F_2 crosses (ASBxASB) were produced. The results of two consecutive trials using the two crosses and the Australorp to assess growth and egg production performance have been presented by Jambui and Quartermain (in press) and are summarized as follows. Results of the growth performance indicate that the F1 has a better feed conversion ratio of 6.07-6.20 compared to the F2, 6.08-6.80, and Australorp, 6.22-6.60. Age at first egg was reduced for the crosses (115-120 days) compared to the Australorp (126-137 days). Feed intake of the crosses increased with higher body weight. Weekly egg number and weights were consistently higher for the F1 cross (5.66±0.095-5.94±0.19 and 54.37±0.49-56.00±0.57g) compared to the F2 (5.39±0.11-5.81±0.09 and 52.94±0.53-53.75±0.5) and the Australorp (5.25±0.09-5.21±0.09 and 52.84±0.59-55.08±0.62g). Yolk color scores were higher for the Australorp than the crosses; however, shell thickness was not affected by crossbreeding. From these results, the F_1 cross is shown to be the ideal genotype for smallholder egg-producing farmers.

The next logical step is to consider utilizing lower cost feeds for these strains of chicken with the aim of developing least-cost feeding systems for egg and meat production in the rural areas (Quartermain and Biat, in press). NARI research is addressing this and other related issues as means to satisfy the national government goals of food security and improved nutrition, self-sufficiency and income generation. Success would provide opportunities for rural people, especially women and children, to venture into egg and meat production to develop the rural economy and improve the livelihoods of rural households. Land availability is not a limiting factor for village chicken production and hence disadvantaged groups in the community can be the direct beneficiaries of such enterprises. Poultry production has been shown in many parts of SE Asia including Bangladesh, Myanmar and Indonesia, and elsewhere, to address gender issues in agriculture, with activities designed and financed to promote the formation of women's groups and associations for poultry enterprises. In Bangladesh, for example, chicken production has improved the status of landless women through improved access to food and income, as well as increased social status in the rural community (Saleque and Mustafa 1996).

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