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Original Research Paper

Trends in the yield of cut-up parts over four generations of selection in Kuttanad ducks (*Anas platyrhychos domesticus*)

Veterinary Science

KEYWORDS : Kuttanad, ducks, cut-up parts, yield

Stella Cyriac — Kerala Veterinary and Animal Sciences University, Lakkidi P. O., Pookode, Wayanad

Leo Joseph — Kerala Veterinary and Animal Sciences University, Lakkidi P. O., Pookode, Wayanad

ABSTRACT

An experiment was conducted at Kerala Veterinary and Animal Sciences University in order to assess the trends in the yield of cut-up parts in Kuttanad ducks over four generations of selection in Kuttanad ducks. Three generations (S1, S2 and S3) were produced from a base generation (S0) through individual selection based on body weight at eight weeks and pedigree breeding. The yield of cut-up parts of 10 ducks each of either sex selected at random were evaluated at eight, 10 and 12 weeks of age in four generations. Statistical analysis of the yield of cut-up parts between generations revealed that the percentage yield of breast portion was significantly (p<0.05) higher in S3 generation at 8, 10 and 12 weeks of age. The findings suggest that as a result of selection appreciable progress could be achieved in the S3 generation with regard to the yield of cut-up parts

Introduction

Duck is one of the earliest domesticated species of poultry and its rearing started around 4500 years ago. Kuttanad ducks are the indigenous *Desi* ducks of Kerala which include both *Chara* and *Chemballi* varieties. These are hardy water fowls acclimatized to our geographical area and are resistant to many diseases. Though these ducks yield tasty and nutritious meat, they are not reared exclusively for meat because of the low body weight and low feed efficiency. Presently, exotic duck breeds are being reared for meat purpose in Kerala, but the major drawbacks are the low egg yield and high cost of production of ducklings. Since, the Kuttanad ducks are dual purpose birds and are locally adapted; a larger number of ducklings can be produced with a lower cost of production. Moreover, this will open possibilities for raising Desi ducks under confinement system on quality feed, exclusively for meat purpose. These indigenous ducks are having the genetic potential to be developed as a meat type duck. Hence, individual selection based on body weight at eight weeks of age was attempted to develop a meat line of Kuttanad ducks. Studies on the yield of cut-up parts were also carried out to assess the suitability of the line of Kuttanad ducks developed for meat purpose and also to fix the ideal age of slaughter.

Materials and Methods

A selection experiment was conducted with the objective of developing a meat line of Kuttanad ducks at the University Poultry and Duck Farm, Mannuthy under Kerala Veterinary and Animal Sciences University. One thousand and eighty eight (1088) day-old Kuttanad ducklings were procured from progressive farmers of Kerala. This formed the base generation (S_0). Based on body weight at eighth week of age, top ranking 150 females and 25 males were selected through individual selection. These birds were maintained as the parent stock and rest were the unselected stock. From S_0 generation, three more generations (S_1, S_2 and S_3) were produced through pedigree hatching.

The processing studies were conducted in samples drawn from the unselected stock in each of the four generations. The yield of cut-up parts of 10 ducks each of either sex selected at random were evaluated at eight, 10 and 12 weeks of age in four generations, *viz.*, S_0, S_1, S_2 and S_3.

The birds identified for slaughter studies were subjected to pre-slaughter starvation of 4 h before taking the slaughter weight. Ducks were humanely and hygienically slaughtered as per standard procedures (Sams, 2001) in the processing plant attached to the Department of Poultry Science.

Cut-up parts of duck carcass included wings, neck, back, breast and leg (thigh and drumstick). The yield of individual cuts was expressed as per cent of dressed carcass weight. The dressed carcass weight of ducks after removal of blood, feathers, head, feet and viscera were taken and expressed as dressed weight in grams.

The yield of cut-up parts in males and females between generations were analysed statistically as per Snedecor and Cochran (1994) using SPSS version 20.0.

Results and Discussion

The mean yield of various cut-up parts at 8, 10 and 12 weeks of age in the four generations is presented in Table 1.

The yield of wings, neck and back portion was significantly ($p<0.05$) higher at 8 weeks of age in S_0 generation. The yield of breast portion was significantly ($p<0.05$) lower at 8 weeks of age and it increased significantly only at 12 weeks of age. The yield of leg portion was also significantly ($p<0.05$) lower at 8, 10 and 12 weeks of age.

In S_1 generation, the yield of wings and back portion was significantly ($p<0.05$) higher when compared to other generations whereas that of neck and leg portion was significantly ($p<0.05$) lower at all ages. Significantly ($p<0.05$) higher yield of breast portion was observed only at 12 weeks of age.

In S_2 generation, the yield of leg portion was significantly ($p<0.05$) higher at all ages in both males and females. But significantly ($p<0.05$) higher values in the yield of breast portion was observed only at 12 weeks age when compared to that of other generations.

The yield of wings was found to be statistically similar in all the generations at 12 weeks of age but the per cent yield of neck was significantly ($p<0.05$) higher in S_3 generation at 10 and 12 weeks of age. The yield of back portion was significantly ($p<0.05$) lower in S_3 generation at 8 weeks age but it was significantly ($p<0.05$) higher in S_3 generation at 12 weeks of age. The percentage yield of breast portion was significantly ($p<0.05$) higher in S_3 generation at 8, 10 and 12 weeks of age. The yield of leg portion was significantly ($p<0.05$) lower in the S_3 generation when compared with that in the other generations.

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Age (in weeks)	Sex	Wings				Neck				Back			
		S_0	S_1	S_2	S_3	S_0	S_1	S_2	S_3	S_0	S_1	S_2	S_3
8	M	$15.10^{a} \pm 0.27$	$14.75^{a} \pm 0.70$	$15.35^{a} \pm 0.62$	$14.79^{a} \pm 0.39$	$14.43^{a} \pm 0.48$	$12.82^{a} \pm 0.95$	$13.38^{a} \pm 0.58$	$12.88^{a} \pm 0.18$	$27.05^{a} \pm 0.71$	$24.55^{b} \pm 1.10$	$23.01^{b} \pm 0.86$	$23.27^{b} \pm 0.56$
	F	$16.19^{a} \pm 0.53$	$14.84^{ab} \pm 0.64$	$15.38^{ab} \pm 0.43$	$14.45^{b} \pm 0.34$	$13.79^{a} \pm 0.35$	$11.60^{b} \pm 0.73$	$12.56^{ab} \pm 0.45$	$12.44^{ab} \pm 0.36$	$26.41^{a} \pm 0.54$	$25.88^{a} \pm 1.08$	$23.31^{b} \pm 0.81$	$21.74^{b} \pm 0.69$
10	M	$14.25^{b} \pm 0.26$	$15.88^{a} \pm 0.61$	$14.19^{b} \pm 0.53$	$13.38^{b} \pm 0.64$	$12.94^{a} \pm 0.41$	$10.36^{b} \pm 0.43$	$12.53^{a} \pm 0.50$	$13.42^{a} \pm 0.71$	$23.67^{b} \pm 0.71$	$25.79^{a} \pm 0.58$	$25.52^{ab} \pm 0.57$	$23.50^{b} \pm 0.80$
	F	$13.73^{b} \pm 0.34$	$15.55^{a} \pm 0.53$	$13.88^{b} \pm 0.41$	$13.60^{b} \pm 0.54$	$13.05^{ab} \pm 0.56$	$12.18^{b} \pm 0.48$	$11.99^{b} \pm 0.51$	$13.94^{a} \pm 0.70$	$23.72^{a} \pm 1.13$	$25.03^{a} \pm 1.28$	$24.45^{a} \pm 0.30$	$25.51^{a} \pm 1.03$
12	M	$14.49^{a} \pm 0.52$	$14.85^{a} \pm 0.20$	$14.81^{a} \pm 0.49$	$15.63^{a} \pm 0.78$	$13.57^{a} \pm 0.45$	$10.61^{b} \pm 0.64$	$12.46^{a} \pm 0.43$	$13.76^{a} \pm 0.59$	$22.55^{b} \pm 0.75$	$26.71^{a} \pm 1.39$	$20.16^{b} \pm 2.06$	$23.57^{ab} \pm 0.63$
	F	$14.58^{a} \pm 0.40$	$14.84^{a} \pm 0.52$	$14.40^{a} \pm 0.71$	$14.89^{a} \pm 0.96$	$12.10^{ab} \pm 0.49$	$10.76^{b} \pm 0.53$	$12.16^{ab} \pm 0.49$	$12.51^{a} \pm 0.65$	$24.16^{ab} \pm 0.52$	$25.35^{ab} \pm 0.77$	$23.11^{b} \pm 1.03$	$26.47^{a} \pm 1.08$
Age (in weeks)	Sex	Breast				Leg							
		S_0	S_1	S_2	S_3	S_0	S_1	S_2	S_3				
8	M	$18.62^{c} \pm 0.98$	$23.91^{b} \pm 1.64$	$22.51^{b} \pm 0.62$	$27.11^{a} \pm 0.53$	$22.58^{b} \pm 0.63$	$23.13^{b} \pm 0.60$	$25.54^{a} \pm 0.87$	$21.32^{b} \pm 0.42$				
	F	$19.34^{c} \pm 0.74$	$21.19^{bc} \pm 1.27$	$23.06^{ab} \pm 0.73$	$28.49^{a} \pm 0.89$	$24.20^{ab} \pm 0.70$	$23.25^{b} \pm 1.02$	$25.65^{a} \pm 0.68$	$22.43^{b} \pm 0.48$				
10	M	$28.38^{a} \pm 0.94$	$25.08^{ab} \pm 1.36$	$23.50^{b} \pm 1.46$	$27.62^{a} \pm 1.19$	$19.68^{b} \pm 0.58$	$22.78^{a} \pm 0.78$	$23.99^{a} \pm 0.49$	$19.49^{b} \pm 0.54$				
	F	$29.61^{a} \pm 1.15$	$25.79^{bc} \pm 0.93$	$24.80^{c} \pm 1.04$	$28.34^{ab} \pm 1.03$	$19.01^{c} \pm 0.43$	$21.16^{b} \pm 0.66$	$24.81^{a} \pm 0.73$	$20.27^{ab} \pm 0.92$				
12	M	$28.27^{a} \pm 0.56$	$26.65^{a} \pm 0.89$	$27.89^{a} \pm 1.32$	$28.15^{a} \pm 0.54$	$19.58^{b} \pm 0.34$	$19.66^{b} \pm 0.78$	$22.05^{a} \pm 0.35$	$18.84^{b} \pm 0.73$				
	F	$27.46^{a} \pm 0.99$	$28.75^{a} \pm 0.84$	$28.39^{a} \pm 1.57$	$26.93^{a} \pm 0.67$	$19.26^{b} \pm 0.38$	$20.08^{ab} \pm 0.59$	$21.89^{a} \pm 0.66$	$18.98^{b} \pm 0.99$				

Table 1 Yield of cut-up parts at 8, 10 and 12 weeks of age in four generations of male and female Kuttanad ducks, per cent

[(a, b, c, d)] Means bearing identical superscripts in a row did not differ significantly within the same group ($p<0.05$); n=10 in each cell

It is inferred that the yield of wings, neck and back did not change with increase in age, between sex and between generations. The yield of breast portion increased from 8 to 12 weeks of age in S_0 generation. This improvement was more noticeable from 8 to 10 weeks and a slight decrease occurred during 10 to 12 weeks in S_0 generation. In S_1 and S_2 generations, appreciable improvement in yield of breast portion could be noticed more in females than males. In S_3 generation, the highest yield was given by the breast portion at 8th week itself and it was maintained at 10th and 12th weeks also whereas in the previous generations breast portion yielded the highest per cent at 12 weeks of age. Hence, the improvement in the yield of breast muscle with age was found to have decreased over generations. Also, appreciable increase could be observed in the yield in the breast portion at 8 weeks of age over generations. This might be due to selection for increased body weight which in turn caused the early development of muscles. Since, ducks are water fowls the breast muscles are the one which have to be developed faster and hence the early improvement occurred in this portion by selection. On the contrary, the yield of leg portion was found to have decreased with increase in age and the decrease was more or less same in either sex in all generations from 8 to 12 weeks of age. Hence, considering the yield of cut up parts at various ages, slaughter age could be fixed at 8 weeks of age in the meat line of Kuttanad ducks.

George (1978) and George (2013) reported similar values for the per cent yield of neck, wings, back and leg portion whereas that reported by Thomas (2003) was lower than the present findings at 8 weeks of age. The yield of breast portion recorded by Thomas (2003) at 8 weeks is in agreement to the findings in S_3 generation while it was higher than that in other generations. Bernacki *et al.* (2008), Kokoszynski and Bernacki (2009) and Xu *et al* (2011) reported lower values for yield of breast and leg portion. Pingel (1999) and Maruyama *et al.* (1999) reported similar growth pattern of breast and leg portion as that observed in S_0 generation. The increased yield of breast portion observed at 8 weeks in Kuttanad ducks in S_3 generation is in agreement with the reports of Pingel (1999) in Pekin ducks. The increase in the weight of breast portion observed in the present study falls in the range mentioned by Stadelman and Meinert (1977) while the per cent decrease in the leg portion observed in the present findings was lower than the reports of the author. The findings suggest that as a result of selection appreciable progress could be achieved in the S_3 generation with regard to the yield of cut-up parts.

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