Past, present and future duck breeding

The Second Keith Gooderham Waterfowl Lecture

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Groupe Grimaud has as its mission statement 'The development of high value activities upstream in the global animal and health sectors' and within this we have a core business of genetically selecting high quality animal breeding stock in the chicken, duck, goose, guinea fowl, pigeon, rabbit and pig sectors.

Downstream of this there is a key business that focuses on the multiplication, hatching and sales of day old ducklings.

This article focuses on the past, present and future of duck breeding because if we know where we want to go we must know where we have come from!

More than meets the eye

A duck is not just a duck – there are various types and these and their respective attributes and how they fit into different world markets will be considered before the four eras in duck production are reviewed.

The three duck breeds are the Muscovy or Barbary, the Pekin and the Mule. Their respective characteristics are in Table 1.

There have been four eras in duck production. The first was from 1970-80 and was very much based on traditional breeding and the use of pedigree floor pens with trap nesting.

At this time the geneticists focused on liv-

Recording fillet yield with the echograph.

ability, liveweight, phenotypic homogeneity and laying performance.

Data was processed externally and practical problems resulted in loss of data and poor precision. This approach was labour intensive.

In the second era from 1985-99 the ducks were pedigreed in individual cages and artificial insemination was used, thereby guaranteeing paternity.

This meant perfect pedigree precision and the beginning of selection for FCR.

In addition, it provided a health benefit in that cages favoured salmonella eradication.

BLUP (Best Linear Unbiased Prediction) was coming to the fore which necessitated automatic recording of data.

At this time work was done on carcase composition with the emphasis being on meat and fat yield. All data was processed internally on in-house programs.

Selection priorities were as in the previous period plus leg strength, body composition

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Pedigree laying cages.

Pedigree family pens.

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in terms of meat and fat yields, FCR, fertility, hatchability, egg weight and eggshell quality.

Natural behaviour observed

The third era was from 1999-2007. Interestingly, in this period some lines were returned to floor rearing so that natural behaviour could be observed. This was especially important in terms of sexual behaviour (fertility) and mobility (leg strength).

By now meat yield was being determined by echograph which was an important step forward because it avoided bird wastage associated with carcase dissection – once a bird had been cut up it could no longer breed!

This period also saw the advent of the electronic monitoring of feed intake which greatly facilitated FCR determinations under field conditions.

Muscovy/Barbary.

Above, Pekin ducks and, below, Mule.

	Barbary	Pekin	Mule
Egg production (female PS housed)	217 (43 weeks over two lays)	250 (46 weeks)	235 (46 weeks)
Fertility (%)	90-92	90-92	86-87 (via AI)
Slaughter age (days) male Slaughter age (days) female	84 68	42-56	70-77
Bodyweight male Bodyweight female	4.5-5.5 2.4-3.0	3.2-4.0	~ 4.0
Sexual dimorphism (%)	53-54	93-95	90-92
FCR	2.70-2.75	2.00-2.60	3.00-3.20
Fillet yield (% of the live weight)	17.0-17.5	13-16 (according to age)	15-17

Table 1. Characteristics of the three duck breeds.

At this time research into QTLs (Quantitative Trait Loci) was occurring.

Selection now focused on everything that it focused on in the previous two eras plus behavioural traits (because some birds were now back on the ground).

That then brings us to the fourth era – the present.

Biotechnology revolution

The fourth era is one of genomics and new data processing options.

This should enable the quicker identification of genetic strengths and weakness and hence, their faster incorporation into the breeding programme.

The biotechnology revolution is now bringing us tools such as cloning and the potential to develop transgenic birds.

Obviously, with this will come an ethical debate but transgenics could greatly facilitate breeding for resistance against certain diseases and the production of manure that is more eco-friendly.

So, what has selection done for each breed? In practice selection means a reduction in fat content with the associated benefits to FCR and a duck which now produces more lean meat coupled to a very good

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PEKIN DUCK GENETIC IMPROVEMENTS

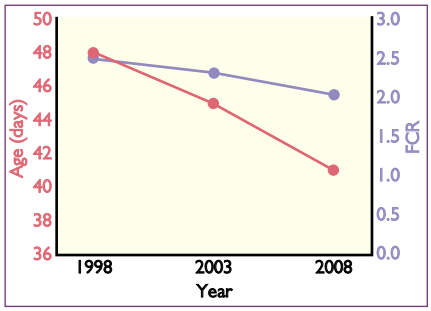

Fig. 1. Evolution of the slaughter age and the FCR at a constant weight of 3.3kg.

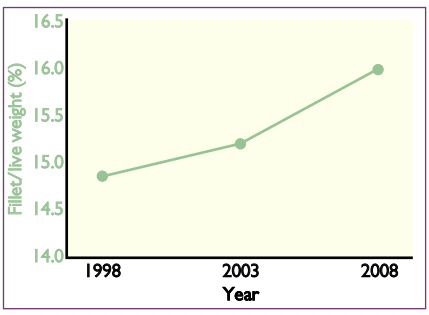

Fig. 2. Fillet weight as a percentage of live weight.

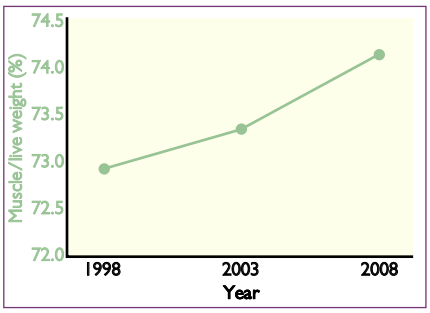

Fig. 3. Muscle percentage.

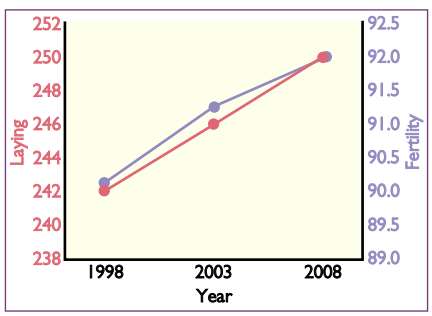

Fig. 4. Evolution of the laying (46 weeks period) and the fertility.

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average daily gain of almost 80g. The details are summarised in Figs. 1-4.

Figs. 5-8 show the quantitative gains achieved by the Barbary. In practice this has resulted in the production of a good fillet which in quality and texture is very similar to beef and keeping the kill age at 77-84 days but increasing weight and fillet yield.

Today the heaviest males produce a kg of red meat (5.5kg at 84 days with a 17.5% fillet yield). If this bird was to be killed out at 51 days it would have a weight of 3.3kg and an FCR of 2.0! Hand in hand with this, parent stock egg production has doubled over three decades. ■

Barbaries in rear.

BARBARY DUCK GENETIC IMPROVEMENTS

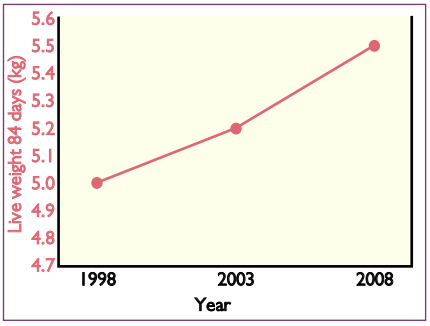

Fig. 5. Barbary heavy males body weight.

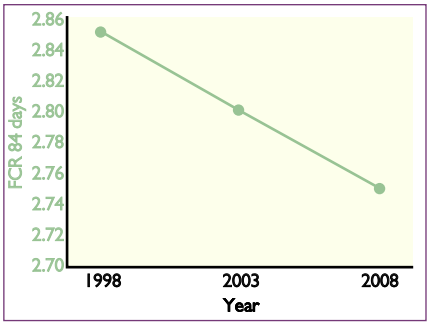

Fig. 6. Improvement in feed conversion ratio.

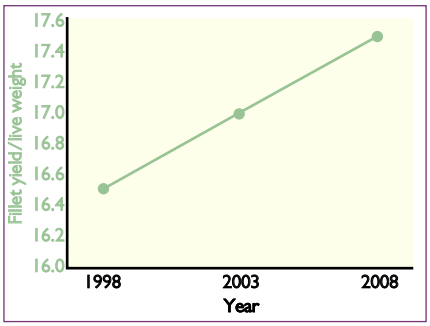

Fig. 7. Fillet weight as a percentage of live weight.

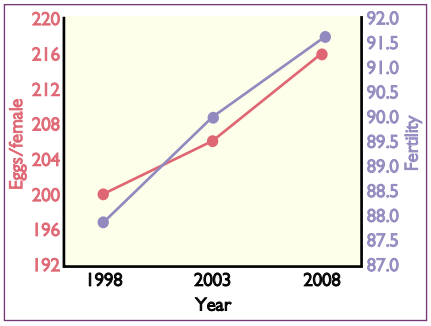

Fig. 8. Barbary egg laying performance and fertility.