

THE NEXT 10 YEARS IN BROILER BREEDING:

What Is Really Going To Happen

QUITE FREQUENTLY, THE question is raised as to what geneticists or other personnel in poultry breeding predict will happen during the years to come. It's nice to sit back and try to dream about cloning, chromosome rearrangement and other sophisticated genetic techniques, but what breeders must think about are practical poultry breeding techniques which will yield results immediately as well as in the long term.

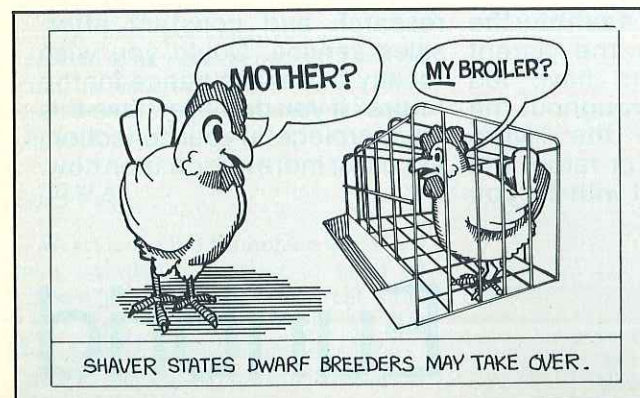
Many of the new areas of genetic research, while exciting from an academic standpoint, are not yet developed to the point where practical application in animal breeding is possible.

Commercial breeding companies and geneticists must be constantly aware of these dramatic discoveries and must strive to identify those which might help to solve some of their problems. A constant awareness of current and anticipated future market demand will help to place new techniques in perspective.

Some of the changes that I am sure will take place over the next 10 years or so, are:

- Broiler growth rates will continue to increase, so that approximately one day less per year will be required to reach the same market weight.
- There will be an improvement in parent performance, mainly through increased egg numbers and, therefore, increased numbers of chicks per mother. Progress depends on the background of the stocks involved, and differences in improvement will vary widely between different genetic populations. All things considered, an increase of two eggs per parent per year would seem to be a reasonable estimate.
- Fertility and hatchability will remain at a high level. There will be little or no change in these traits.
- Colour sexing will undoubtedly become an accepted technique in the broiler industry. Some of the advantages of sex separation rearing are already well established, for example, uniformity of body weight. Nutritional advantages will become more clearly identified as time goes on.

Speaking strictly from the stand-point of sexing, a colour sexing package is preferable to a feather sexing package, since the sexing is done by looking at the chicks while they are still in the hatching trays. This allows the sexor to pick up several chicks in each hand at one time, separating the sexes in a single operation.



Some of the developments which I feel must be considered as "gray areas" are:

- Use of frozen semen and artificial insemination on a commercial scale.
- Use of the dwarf gene to produce a smaller meat mother.
- Feed efficiency and reduction of fat deposition.
- Use of cages to house parent chickens.

There will be those who disagree with listing some of the above topics as having questionable status from a commercial standpoint. However, let's consider each one of these in some detail.

It is clear that with the current rate of progress, fertility levels from frozen semen can readily reach the minimum required levels for practical use, within a 10-year time period. What is questionable here, however, is what practical use can be made of this technique.

To the primary breeder, the number one advantage would be the production of semen banks for key lines and/or maintaining semen from 'super sires' for several years after the live birds have been marketed. Beyond this point, however, there is a major question mark. Can frozen semen in fact replace live males at the hatchery level, bearing in mind the considerable amount of labour outlay which would be required to perform artificial insemination?

It appears that, overall, the economic picture would be better using frozen semen than natural mating in cages. However, this point has yet to be proven in a practical situation. Furthermore, it must be kept in mind that the fertility levels from natural matings on the floor in meat stocks may not be equalled by the use of frozen semen.

This latter statement is not necessarily true at the research or academic level, but in the practical sense in the commercial poultry industry, overcoming the technical difficulties may require a decade or more.

Although there has been a great deal of enthusiasm concerning dwarf breeders, particularly during the last 2-3 years, there are still many questions to be answered.

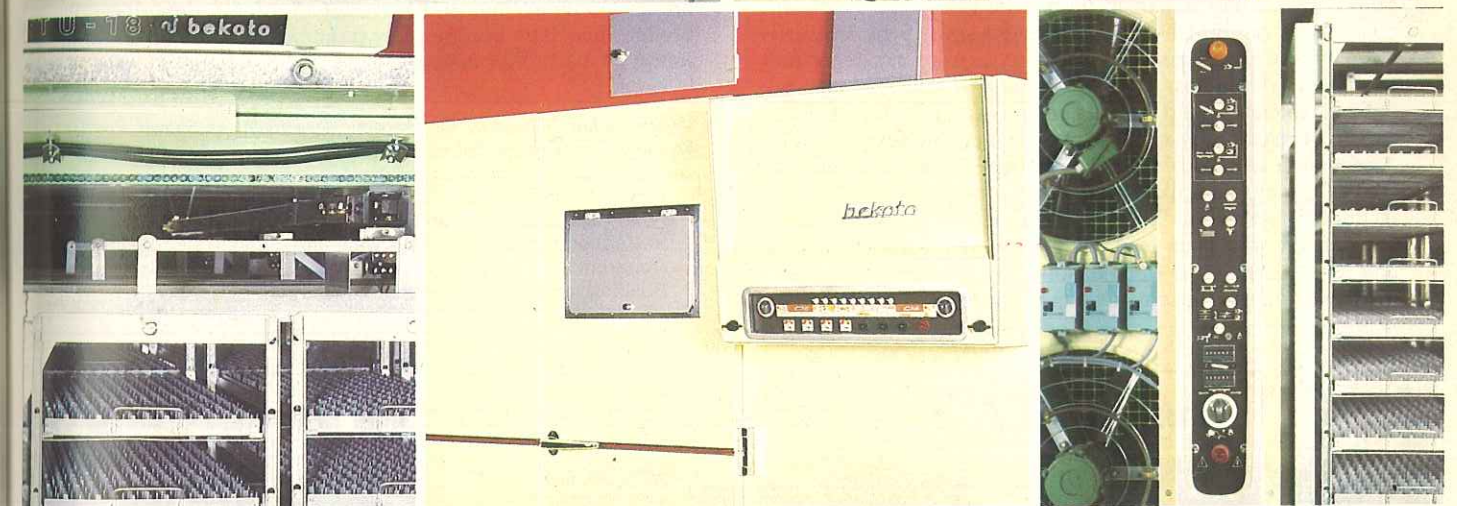
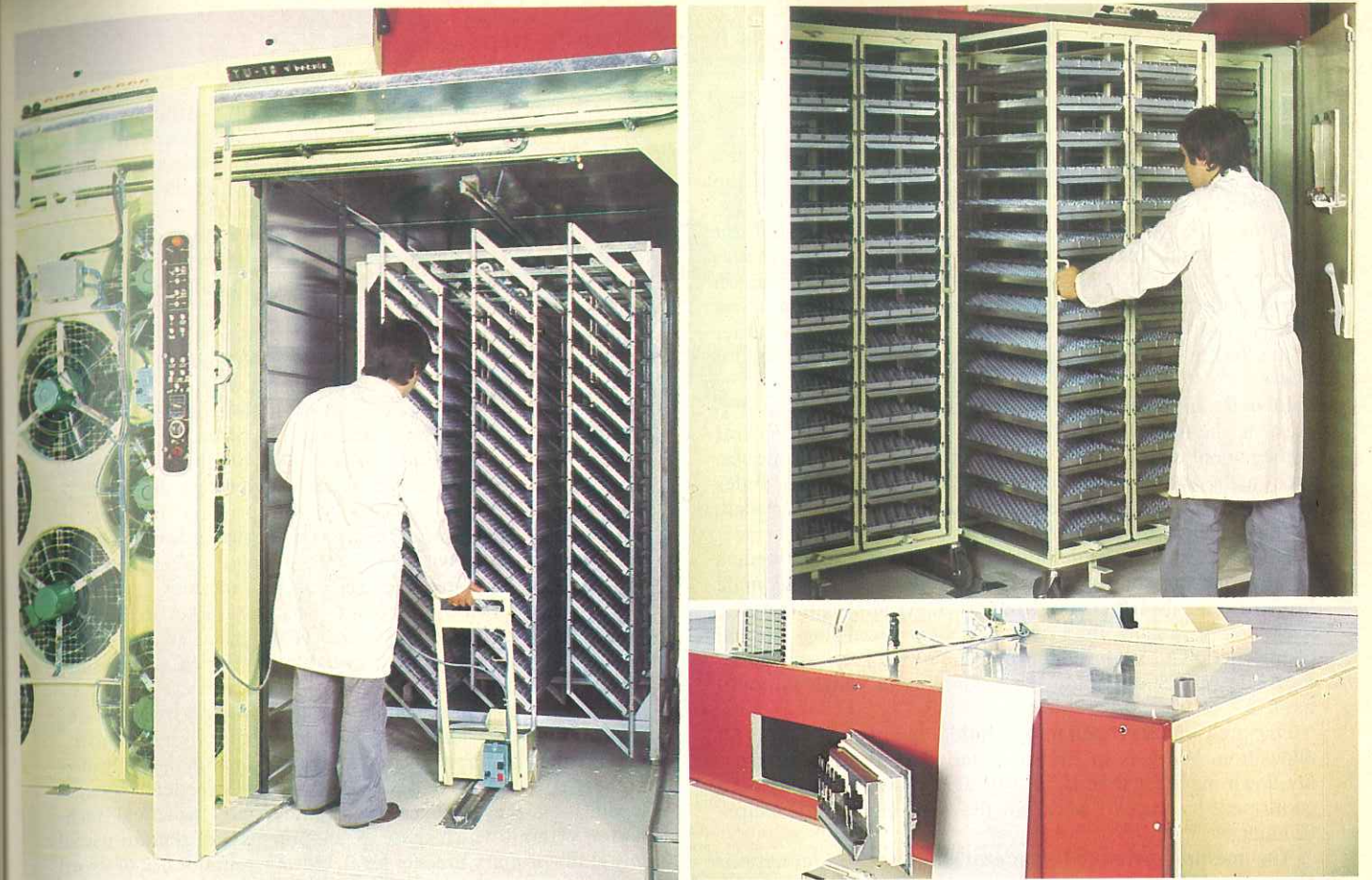
One cannot question the fact that feed utilization in a dwarf breeder is considerably more efficient than in a normal-sized mother. Furthermore, much better use can be made of house space and labour, due to higher stocking density of approximately 18-20%, for dwarfs compared to normals.

This is particularly true when considering cage breeding with artificial insemination. For floor breeding, the density factor is not as important, unless slats can be used for dwarfs in the same way they are used for normals.

Another Potential advantage of dwarf breeders is that they may be more tolerant to hot weather conditions than normal broiler breeders. Thus, their performance would not be so adversely affected during heat waves or in hot climates.

There was a time when it was felt that sexual maturity in dwarf chickens was delayed by 7-14 days, compared to their normal sisters. While this may be true of dwarf Leghorns, it is clearly not true of dwarf meat breeders. In fact, dwarf broiler breeders may mature a few days earlier than their normal sisters.

It has also been generally felt that the lower egg weight of mini mothers in broiler stocks will reduce the body weight of



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their broiler off-spring. This potential egg weight effect may be present depending on the genetic background of the particular population involved, but in general the smaller eggs of the dwarf meat parent females seem to have little effect on the body weight of the broiler progeny, in some strains.

Sometimes, dwarf females have been found to have lower egg production than their normal sisters, but this depends more on the genetic background of the stocks involved than on the dwarf gene itself. It is now clear that dwarf broiler mothers will lay nearly as well as their corresponding normal counter parts, and in the not-too-distant future will be equal for this trait.

In order to achieve fertility from dwarf mothers which is equal to the normal mothers, somewhat more care in general management is required. Certain management techniques, such as a different mating ratio, and rearing the males separately from the females, are necessary to give adequate fertility levels from mini breeders.

Now, let's look at the definite deficiencies of dwarf breeders and the questionable areas. It is well established that the male broiler from a dwarf female parent averages approximately 2% lower body weight than male broilers from the normal counterpart. This is an influence of the dwarf gene, carried by the male broiler alongside the normal gene which is dominant.

One area which is open to question at the present time is fat deposition. Workers in France found that dwarf meat-types lay down more fat than do full-sized breeders. This has been confirmed by recent work at the University of Guelph, Canada.

The question therefore becomes: Does this extra fat deposition carry through in part to the broiler offspring? This point needs to be resolved by further research, but if the answer is yes, obviously it aggravates an already existing fat deposition problem in the industry.

Feed efficiency and fat deposition are two topics listed together because they are intimately related one with the other. A reduction in the size of the abdominal fat pad will improve feed efficiency, particularly when this is measured as efficiency of protein production. Simply stated, deposition of excess fat can happen only when feed energy is wasted. Both geneticists and nutritionists must work to solve this problem.

The abdominal fat pad averages approximately 2-2.5% of

the total body weight of the modern broiler. Although more research is required, it appears that fat deposition is fairly highly inherited, permitting some progress by selecting for less fat. If the geneticists can reduce this to 1.5% of the total body weight, then any further reduction required should be well within reach of the nutritionists. It is important, however, not to reduce the amount of fat too far, since fat beneath the skin and in the muscle improves the flavour and palatability of the broiler.

Although there is a relationship between fat content and feed efficiency, the latter is being studied and selected as a separate trait as well as in conjunction with fat deposition. There are definite differences between individual birds for feed efficiency, regardless of the amount of fat laid down.

Cage breeding is being discussed last because it is related directly or indirectly to some of the above topics. Breeding in cages has distinct advantages to the primary breeder, in particular because of the higher density per unit of building space, and greater accuracy in keeping records of performance for females in the pure line breeding programmes.

For cage breeding at the broiler parent level to become economically attractive, it would be essential to use dwarf mothers, preferably supplemented with frozen semen and artificial insemination.

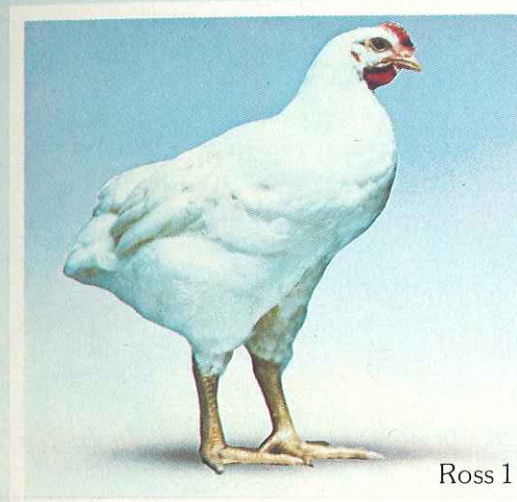
In conclusion, improvement in body weight remains the number one criterion for the commercial broiler industry, accompanied by improvement in egg production of the broiler mother. Use of frozen semen and parent breeders in cages depends on the discovery of commercially practical techniques, without which these developments will remain useful only at the primary breeder level. However, major use of dwarf broiler mothers, and some reduction of fat deposition in broilers, may both become important factors in the foreseeable future in the broiler industry.

—Dr Howard French

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Age in days	Liveweight					
	Males		Females		As-hatched	
	kg	FCR	kg	FCR	kg	FCR
42	1.76	1.88	1.47	1.92	1.62	1.90
49	2.22	1.97	1.81	2.07	2.02	2.02
56	2.70	2.10	2.14	2.22	2.42	2.16
63	3.19	2.21	2.46	2.37	2.83	2.29
70	3.63	2.36	2.77	2.58	3.20	2.47

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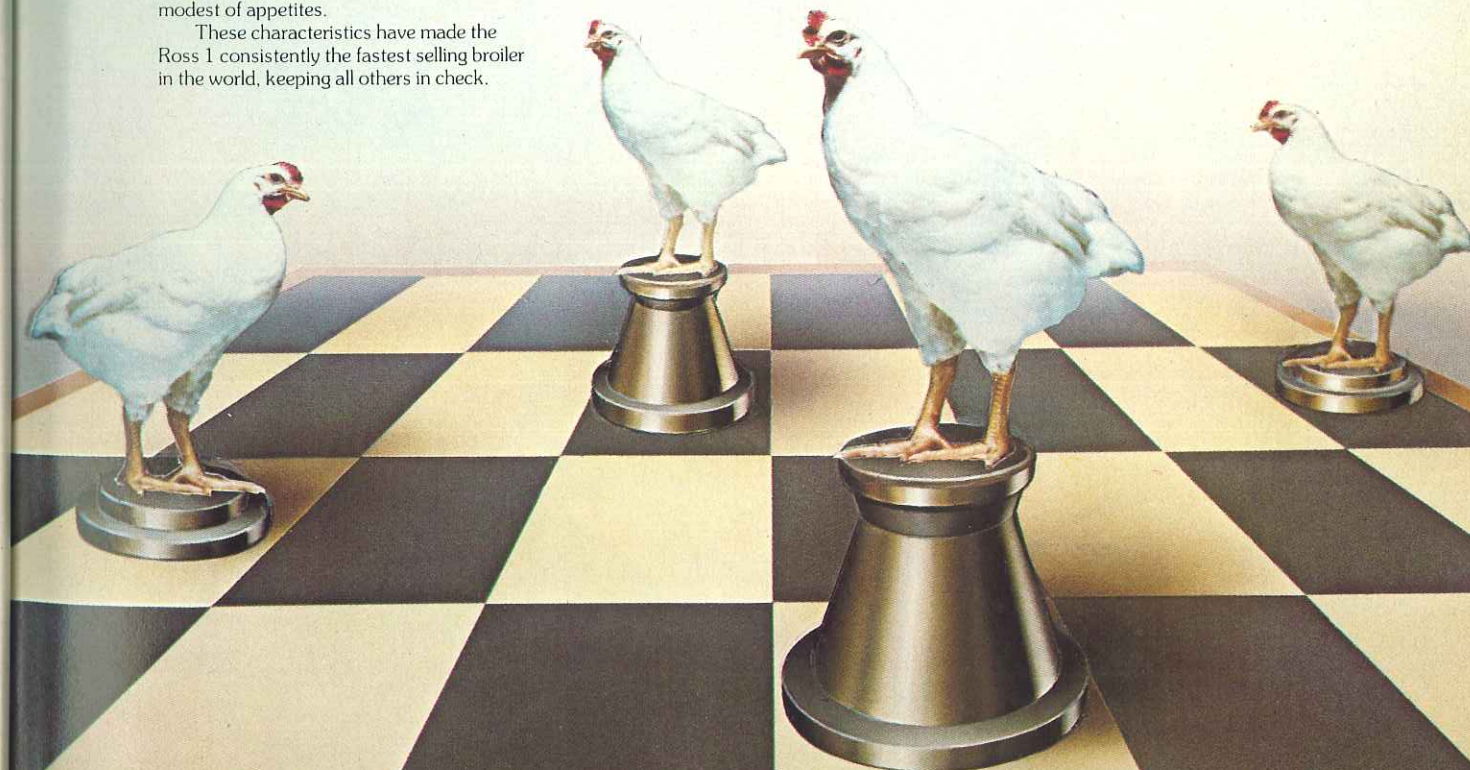
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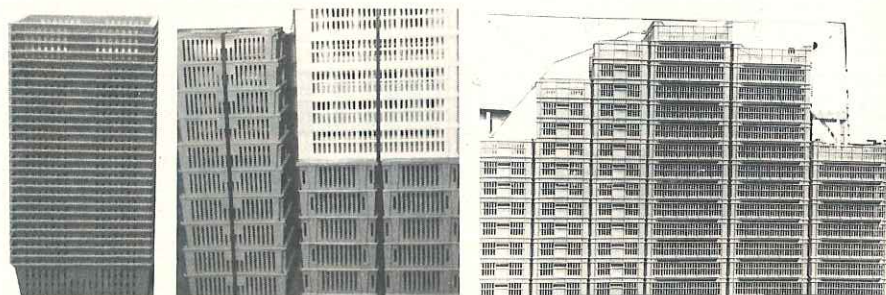
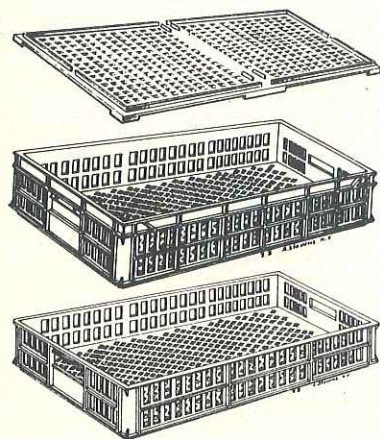
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