# Using simulation models to

***It is time for the capital-intensive ostrich industry to make use of the techniques of simulation models. This way the producer can acquire market requirements for specific end products with specific properties and at a specific stage.***

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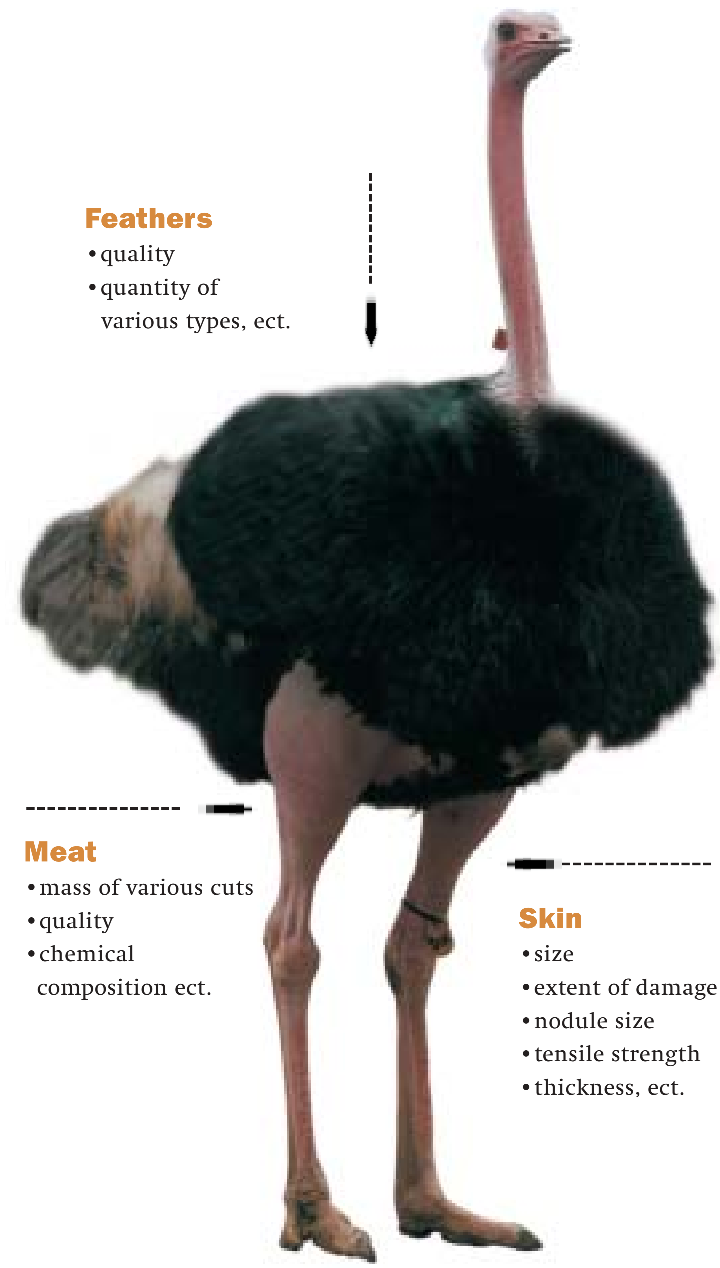
The techniques of simulation models are being used with great success in the poultry and pork industries throughout the world. In South Africa a model of this kind has been developed by the University of Natal for the local broiler industry and is used successfully.

The time has come for the ostrich industry, which is a predominantly capital-intensive industry, to also make use of the techniques of simulation models. The models, that make simultaneous use of biological and mathematical principles, will help the producer in his decision-making process and enable him to meet the market requirements for specific end products with specific properties at a specific stage in the most economical way possible.

Scientific data about the feeding requirements and production characteristics of ostriches is limited compared to other commercial farm animals. There are still divergent opinions with regard to the feeding requirements. For example, during an investigation in Europe it was found that the recommendations concerning diet protein vary from 14.6% - 22.0% for starter diets, 15.0% - 21.8% for grower diets, 12.0% - 17.8% for maintenance diets and 16.0% - 22.0% for breeder diets. Recommendations for the energy content of commercial ostrich diets varied between 7.9 – 10.6 MJ ME per kg dry matter.

In South Africa alone about 250,000 tonnes of ostrich feed is used annually, at a cost of about US$65 million. A saving of only 10% would result to a total saving of about $6.5 million per year for the local industry. It is clear that the application of modern techniques and scientific principles would be of considerable benefit to the industry, and improve its competitiveness in relation to other industries.




**Market requirements of ostrich end products.** *(Photo: World Poultry)*

## Practical application of optimising models

Intensive commercial ostrich production is all about decision-making. The producer's decision-making is aimed at ensuring the maximum possible profit for the venture. However, the decisions made depend upon various practical factors, namely market requirements on the one hand and the means at

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his disposal and his circumstances on the other. Thus, for example, the market requirement with regard to ostrich end products could be specified into skin, meat and feathers.

The producer's circumstances and the means at his disposal may involve the following:

- Genotype (growth potential of types, breeds, etc.)
- Influence of the environment (seasonal and locality)
- Potential intake of the animals
- Availability, quality and prices of raw products
- Availability, quality and prices of commercial feeds
- Feed processing techniques
- Management practices (e.g. to harvest feathers or not, to separate sexes during raising or not, etc.)

It is possible to attach a monetary value to both the market requirements and the means at the disposal of the producer. By utilising the computer's capacity, as well as certain biological and mathematical principles, it becomes possible for the program or model to assemble and process the available information to help the producer with his decision-making.

Moreover, the optimal strategy will vary continually as economical circumstances and market requirements vary. The accuracy of the prediction will, however, also depend on the availability and accuracy of information. Such a model would also have to be adapted and improved as more information is gathered and becomes available.

## Adapted broiler model

The broiler model that was developed by Prof Rob Gous at the University of Natal in South Africa, will be adapted for use in the ostrich industry. In this model three aspects of the feeding programme are optimised, namely:

- The amino acid content of each feed within a fixed feeding programme.
- The energy content of each feed within a fixed feeding programme.
- Optimal feeding programme for feeds of a specific fixed composition.

The Ostrich Research Unit of the Elsenburg Agricultural Research Centre in South Africa is currently gathering data for such a model for the ostrich industry. The data for one growth cycle (14 months) have already been gathered and are currently being analysed and processed.

Typical information that is being gathered by means of experiments, for use in the model contains:

**Biological data**

- Growth curves for different seasons, localities, breeds and sexes, under circumstances where feeding limitations did not apply.
- Determining the body composition (amino acids, fat, fatty acids, energy value, etc. of the total animals (carcasses) at different stages.
- Determining the body composition of animals at various stages under different feeding strategies.
- Determining the separate development of the various body components (meat, feathers and skin) of the bird at different stages.
- Measuring of the development of all the economically important products and their quality-related properties at various stages of development (e.g. the development of the 17 different meat cuts over time, the size of the skin, skin damage, the skin nodule size and tensile strength of the skin over time, etc.).

**Economic data**

- Prices of the various end products according to quality criteria.
- Prices of raw products and / or commercial feeds.

**Management data**

- Effect of feather harvest on production.
- Effect of feed processing on production.

**Table 1 – Effect of 25% price increase in feed costs on energy content of the feed**

| Feed price ($) | Diet energy value | | | Production in terms of feed | Margin above |
|---|---|---|---|---|---|
| | Starter MJ/kg | Grower MJ/kg | Finisher MJ/kg | conversion efficiency (kg feed per kg mass gain) | feed cost ($/bird) |
| Base | 13.0 | 11.0 | 10.0 | 6.5 | $185 |
| +25% | 12.5 | 11.5 | 10.5 | 6.0 | $182 |

**Table 2 – Effect of 25% price increase of protein source on amino acid content of the diet**

| Feed price ($) | Diet lysine content | | | Production in terms of feed | Margin above |
|---|---|---|---|---|---|
| | Starter MJ/kg | Grower MJ/kg | Finisher MJ/kg | conversion efficiency (kg feed per kg weight gain) | feed cost ($/bird) |
| Base | 1.0 | 0.8 | 0.5 | 6.5 | $128 |
| +25% | 0.9 | 0.7 | 0.5 | 6.8 | $119 |

**Table 3 – Effect of end product price change on feeding strategy**

| Price of end product ($) | Optimal feeding period (days) | | | Feed conversion efficiency (kg feed per kg weight gain) | Margin above feed costs ($/bird) |
|---|---|---|---|---|---|
| | Starter diet | Grower diet | Finisher diet | | |
| $312 | 0 – 90 days | 90 – 180 days | 180 – 330 days | 6.5 | $125 |
| $250 | 0 – 50 days | 50 – 100 days | 100 – 350 days | 6.5 | $119 |

## Practical functioning of the model

The following are fictitious examples:

**Optimising the energy content of the feed.** *Table 1* presents an example of the effect of a 25% price increase in feed costs on the energy content of the feed. If, for example, the price of feed changes, the model makes an adaptation in the energy content of the diet in order to maintain production of the required end product in the most economical way possible.

**Optimising the amino acid content of the feed.** *Table 2* presents an example of the effect of a 25% price increase in the protein source on the amino acid content of the diet. If the price of proteins increases, the model makes an adaptation in the amino acid content of the diet in order to maintain production of the required end product in the most economical way possible.

**Optimising the feeding programme or feeding schedule**. *Table 3* presents an example where commercially produced starter, grower and finisher feeds are used. At a specified price for the end product at a given stage the model is able, for example, to make an adaptation in the feeding programme or feeding schedule in order to produce the required end product more economically.

## Summary

It is certain that the use of computer-based mathematical models have major advantages for all commercial animal production industries. Scientific data for the ostrich industry is relatively scarce. It is essential that any data gathered in the future be utilised in the best possible way for the benefit of the industry. It is an excellent technique to gather scientific data and pass it on to the producer in a format that can be used in practice. ●

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