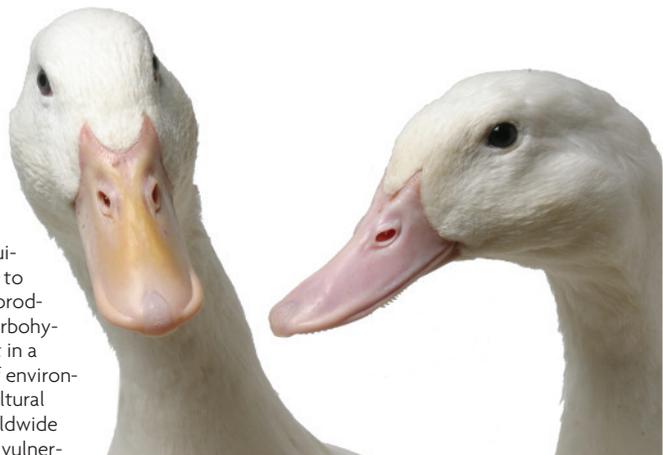


# Formulation and manufacture of feed for ducks



During more than 50 years of duck production, Cherry Valley has been actively involved, either directly or indirectly, in much of the research and development work in duck nutrition. The lessons that we have learned concern nutrient specification, the selection of raw materials and feed manufacture.

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Successful duck production demands correctly formulated and manufactured feed – Quality Assurance – and that it is tested – Quality Control – to ensure that it meets the expected standard.

## Raw material quality

The use of poor quality raw materials or giving incorrect nutrient values to feed ingredients will result in the manufacture of poor quality feed.

**Table 1. The production benchmarks for SM3 parents and growing stock, based on current results and using feed formulated to Cherry Valley specifications.**

Parent	
Age at point of lay	24 weeks
Lay length	50 weeks
Eggs per female	296
Average hatchability	84%
Day-olds per female	241
Commercial	
Production age	36-49 days
Process weight	3.0-3.9kg
Feed efficiency	1.75-2.29
Farm losses	3%
Processing rejects	2%
Cycle length	60 days

The nutritionist's skill is in understanding the quality of the ingredients that he has available and making sure that the assumed nutrient values match the real quality at the time of formulation. It is common for a consulting nutritionist to find that poor quality feed results from mistakes in feed formulation that are due to the use of nutrient matrix values that have been taken directly from a textbook.

Some ingredients, like wheat, corn, soya and sunflower will be consistent in nutrient content if they come from reliable sources. Even so, the crude protein level in UK wheat, for example, has ranged between years and regions from 8.5% to 14.75% since 2001.

Blended or by-product materials, like meat and bone meal, poultry by-product meal, fish meal, wheat or rice bran, however, can be very variable if they are not bought to an agreed specification. As well as nutrient content, ingredients can vary in other aspects of quality.

Ducks are particularly sensitive to mycotoxins, which can reduce feed intake, growth rate, egg production and cause liver damage that can lead to high mortality.

These toxins arise when particular moulds grow in suitable conditions of moisture and temperature. Moulds may proliferate without producing toxins, so mouldiness does not itself indicate toxicity.

For example, discoloured maize may have a high aflatoxin content, but this is not always the case.

More than 200 different mycotoxins have been identified, but the most widely known are aflatoxins, which are mycotoxins produced by particular strains of *Aspergillus* species fungi.

*Aspergillus flavus* is ubiquitous and able to grow on any product of high carbohydrate content in a wide range of environments. Agricultural products worldwide are therefore vulnerable and, although aflatoxins are found in many other ingredients, maize is most commonly associated with aflatoxicosis. There are considerable annual and regional differences in maize aflatoxin content.

In a survey in France, out of 380 batches of ingredients or compounded feed 167 were toxin-contaminated. In a contaminated batch, less than 1% of the grains may account for all of the toxin, so sampling needs to be thorough and precise if a true picture of a bulk commodity is to be established.

Young ducks are limited in their ability to digest saturated fats, so the ratio of saturated to unsaturated fatty acids in the starter diets and the quality of the fats used in the feed needs to be controlled.

The levels of anti-nutritional factors such as histamines (biogenic amines) in fishmeals or trypsin inhibitor in soya beans and field beans can be determined and their inclusion levels should be controlled.

## Screening and testing

Test kits are commercially available that allow checks to be made on the effect of heat treatment on soya bean meal. These compounds can reduce appetite and may be

toxic at higher levels of contamination.

Toxins, especially mycotoxins produced in the field (ergot and fusarium in wheat) or in storage (aflatoxin) need to be monitored and controlled.

Take care to ensure that maize used in duck feed, in particular, is free of mycotoxins and this can be achieved by a screening procedure that segregates grain arriving at the mill according to whether it is free of toxins or not.

Grain with moderate toxin contamination may be safe for other species, allowing the clean material to be reserved for ducks.

This rule may limit the availability of maize for duck feed production, but it is preferable to suffering the problems caused by high levels of aflatoxin and other mycotoxins.

High environmental temperature or high humidity will both increase the rate of decline in vitamin levels and other aspects of quality, and will encourage mould growth and increase the risk of toxin production.

The addition of a mould inhibitor and an antioxidant to the feed will help to prolong its life, but feed should be used within four weeks of manufacture in temperate climates

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**Table 2. An outline of the range of feeds recommended for Cherry Valley SM3 ducks; the management guide for nutrition gives the detailed nutrient specifications.**

	Feed for parent stock			Feed for growers			
	Starter	Grower	Production	Starter 1	Starter 2	Grower	Finisher
Feeding period or amount	0-6 wks	7-20 wks	20+wks	500g/bird	750g/bird	4.0kg/bird	To slaughter
Energy (kCal/kg)	2900	2850	2700	2850	2900	2900	2950
Crude protein (%)	22.0	16.5	18.5	22.0	20.0	18.5	17.0

Continued from page 11 and within seven days in less favourable conditions where temperature and humidity are high.

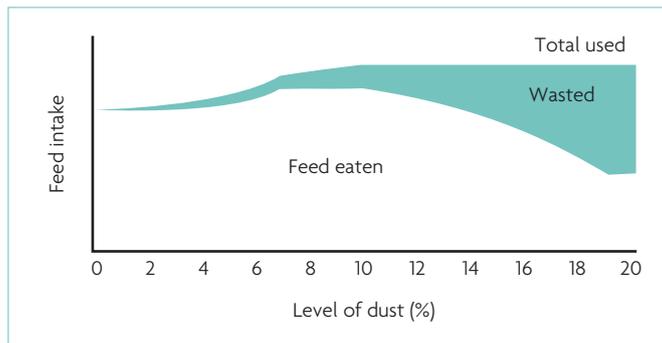
### Diet form and quality of final rations

Ducks must be fed pelleted feed and at Cherry Valley we have found that a pellet no more than 3mm in diameter and 10mm long is suitable for ducks of all ages.

To achieve this the feed mill uses a 3.2mm pellet die, cuts the length to 10mm and uses grinder screens that are 3.5 and 4.0mm. We have not found it necessary to give young ducklings a crumbled feed during brooding (0-2 weeks), but after three weeks of age the pellet

**Table 3. The distribution of particle sizes within a sample of Cherry Valley feed sieved after grinding, but before pelleting.**

Sieve test results	
1.70mm	14.3%
1.18mm	22.5%
0.30mm	58.3%
<0.30mm	4.9%



**Fig. 1. The effect of dusty feed on the agricultural performance of growing ducks. When the dust level exceeds 7% the birds do not consume more feed, but amount of feed wasted tends to increase, leading to poorer feed conversion. When the dust level exceeds 10% the total amount of feed used remains constant, but the birds eat less. The result is lower growth rate and an increase in wasted feed that together will significantly reduce feed conversion efficiency.**

size may be increased to 4mm diameter and 15mm length.

The quality of the feed offered to the birds will depend on the quality of the ingredients and the manufacturing process, as well as feed handling, transport and storage. It is important that pellets should be good quality and that the feed has a low level of dust. Pellet durability is key and the Holmen Pellet score, a measure of pellet breakdown, should be better than 94%.

Wheat based feeds are more eas-

ily pelleted than maize (corn) diets, but the 'fines' or dust particles are far less palatable than maize fines.

Dust and fines can be kept to a minimum by careful grinding of raw materials and using the correct combination of moisture, added fat and pellet binders (commonly ligno-sulphonates) during pellet manufacture.

Table 3 illustrates the distribution of particle sizes for the wheat-based feed used by Cherry Valley Farms, from pellets with a high aver-

age Holmen Pellet score (greater than 96%). If the pellet quality is poor then ducks will still grow and lay eggs, but they will be very wasteful and feed conversion efficiency will be low (Fig. 1). The ducks will eat the pellets and leave most of the dust in the feeder. Some of the dust will be carried on the birds' beaks to the drinkers where it will contaminate the water supply.

### Summary

Duck feed formulations at Cherry Valley Farms are based on wheat and soya beans, with a limited range of other ingredients. Care is taken to monitor and control the quality of raw materials, which are all of known nutrient content, to ensure that they do not contain unacceptable levels of antinutritive factors.

There is zero tolerance of mycotoxins, which are particularly damaging for duck production. All feed is pelleted and care is taken to produce pellets with high durability and a low level of dust, to maintain high levels of productivity and the best feed conversion. ■

The Holmen Pellet Tester is produced by Borregaard Lignotech [www.lignotechfeed.com](http://www.lignotechfeed.com)