1-1-1964

Poultry: toxic factors in protein supplements

D F. Hessels
IMPORTANT DISCLAIMER

This document has been obtained from DAFWA's research library website (researchlibrary.agric.wa.gov.au) which hosts DAFWA's archival research publications. Although reasonable care was taken to make the information in the document accurate at the time it was first published, DAFWA does not make any representations or warranties about its accuracy, reliability, currency, completeness or suitability for any particular purpose. It may be out of date, inaccurate or misleading or conflict with current laws, polices or practices. DAFWA has not reviewed or revised the information before making the document available from its research library website. Before using the information, you should carefully evaluate its accuracy, currency, completeness and relevance for your purposes. We recommend you also search for more recent information on DAFWA's research library website, DAFWA's main website (https://www.agric.wa.gov.au) and other appropriate websites and sources.

Information in, or referred to in, documents on DAFWA's research library website is not tailored to the circumstances of individual farms, people or businesses, and does not constitute legal, business, scientific, agricultural or farm management advice. We recommend before making any significant decisions, you obtain advice from appropriate professionals who have taken into account your individual circumstances and objectives.

The Chief Executive Officer of the Department of Agriculture and Food and the State of Western Australia and their employees and agents (collectively and individually referred to below as DAFWA) accept no liability whatsoever, by reason of negligence or otherwise, arising from any use or release of information in, or referred to in, this document, or any error, inaccuracy or omission in the information.
Toxic Factors in Protein Supplements

By D. F. HESSELS, M.D.A., Poultry Branch

The toxic effect of low quality and/or stale protein supplements can be a problem in the poultry industry. This article describes trials carried out to assess their importance in Western Australia.

POULTRY farmers rely mainly on meat meals, meat and bone meals, whale meals, and more recently, fishmeal, to supplement their protein requirements for poultry rations.

The meat meals and meat and bone meals are produced all the year round, while the whale meals are only manufactured during certain times of the year. A seasonal shortage of protein supplements does, therefore, occur before the new season's whale meal becomes available. This shortage forces farmers to use either stale or inferior quality protein supplements which can cause a sudden drop in egg production.

Six complaints of this nature were investigated and in all cases the lowered egg production appeared to be caused by feeding stale whale meal.

The egg production on one farm dropped from 65 per cent. to 25 per cent. in five days as a result of including this stale whale meal in the ration. Post mortem examination showed that all birds had severe enteritis.

The suspect whale meal was excluded from the diet and the birds were treated at the curative level with Terramycin in the drinking water for five days. Production returned to about 65 per cent. in six weeks.

This complaint was investigated in August 1961; the production of that particular type of whale meal had ceased in July 1960. The whale meal was therefore at least 13-months old.

Feeding Trial

A sample of this whale meal was obtained for experimental purposes. It contained 56 per cent. crude protein, 15 per cent. P.O., and 14 per cent. Ca.

Individual production of a number of laying birds was measured for six weeks. Birds were separated into two equal groups of 20 birds. The percentage lay of the two groups was 53.2 per cent. and 53.6 per cent. respectively during the six weeks before the experiment started.

This experiment was carried out with 14 month-old first-cross hens. The birds were housed in individual laying cages to offset any possible build-up of bacterial action in the deep litter.

One group of birds was fed a standard laying ration (15.9 per cent. protein) while the other group was fed the same ration except that the animal protein fraction was made up from the stale whale meal.

Egg Production

Average production of the birds on the stale whale meal dropped considerably after two weeks (see Graph). The drop in production was not as sudden as that previously experienced on the farm, probably because the birds did not come into contact with their own droppings.

Mortality

Mortality on the farm was negligible and only two birds in each group died during the experiment.

Overseas investigations have revealed a hydropericardium (fluid in heart sac), hydroperitonium (accumulation of fluid in abdomen), swollen liver, swollen and pale kidneys with a subcutaneous edema (fluid accumulation under the skin) often present in the lower portion of the body when toxic fat has been fed to laying pullets.

At the conclusion of the experiment, 10 hens from each group were examined in the laboratory. All symptoms listed above...
were found in the 10 birds from the stale whale meal ration while none of these symptoms were found in the control birds. In addition, all 10 birds from the stale whale meal ration suffered from severe enteritis.

![Graph](https://via.placeholder.com/150)

**Source of Toxicity**

This trial demonstrated that a toxic substance was present in this particular sample of stale whale meal, presumably a toxic fat formed during storage.

A second trial was carried out to confirm that the toxicity of the stale whale meal resulted from storage under adverse conditions and was not present in the fresh material. Besides two fresh whale meals, two fresh meat and bone meals were tested in this trial to determine whether any toxicity was present in these materials.

[These were included because investigations in N.S.W. (McDonald and Bielharz) have shown that the bone fraction of the protein supplement was largely responsible for high mortality and severe growth depression in young chicks fed on low quality protein supplements in that State. The results suggested that the toxic factor was formed in the bone by an oxidation process during digestion. The nutritive value increased while the toxicity decreased when anti-oxidants were added to the protein supplements during the digestion process.]

The second trial was done with the sole purpose of demonstrating any toxic effect from the point of view of chick mortality and not to determine the nutritive value or digestibility of the fresh protein supplements.

The following fresh protein supplements were used in this experiment. These four supplements are commonly used in poultry rations in W.A.

The basic ingredients of the rations were: gristed wheat 65 lb., bran 9 lb., pollard 5 lb., dried buttermilk 4 lb., dried brewers yeast 4 lb., vitamin and mineral mixture at recommended level containing 10,000 i.u. vitamin A, 2,000 i.u. vitamin D, 4.4 mg. vitamin B, 5.3 mg. calcium pantothenate, 1.8 mg. K-bisulphite, 60.6 mg. manganese per gram) and a coccidiostat.

The following fresh protein supplements were used in this experiment. These four supplements are commonly used in poultry rations in W.A.

<table>
<thead>
<tr>
<th>Source</th>
<th>Crude Protein (Min.)</th>
<th>Crude Protein (Max.)</th>
<th>Crude Fat (Min.)</th>
<th>Crude Fat (Max.)</th>
<th>Crude Fibre (Min.)</th>
<th>Crude Fibre (Max.)</th>
<th>Sodium Chloride (NaCl) (Min.)</th>
<th>Sodium Chloride (NaCl) (Max.)</th>
<th>Phosphoric Acid (P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt;) (Min.)</th>
<th>Phosphoric Acid (P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt;) (Max.)</th>
<th>Calcium (Ca) (Min.)</th>
<th>Calcium (Ca) (Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Humpback Whales</td>
<td>64.0</td>
<td>5.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.5</td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
<td>7.0</td>
<td>7.0</td>
<td>11.0</td>
<td>11.0</td>
</tr>
<tr>
<td>B. Green Bone</td>
<td>37.0</td>
<td>12.0</td>
<td>2.0</td>
<td>2.0</td>
<td>0.5</td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
<td>7.0</td>
<td>7.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>C. Animal Offals</td>
<td>45.0</td>
<td>9.0</td>
<td>4.0</td>
<td>4.0</td>
<td>0.5</td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
<td>6.0</td>
<td>6.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>D. Whale Meat and Bones</td>
<td>64.0</td>
<td>6.0</td>
<td>5.0</td>
<td>5.0</td>
<td>2.5</td>
<td>2.5</td>
<td>1.0</td>
<td>1.0</td>
<td>14.0</td>
<td>14.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Registered Analysis
Ration 2—Basic ingredients + 30 lb. of protein supplement B.

Ration 3—Basic ingredients + 22.5 lb. of protein supplement C.

Ration 4—Basic ingredients + 14 lb. of protein supplement D.

Each ration was fed to 100 first cross cockerels brooded under charcoal brooders. The trial lasted 10 weeks.

Mortality figures over the 10 weeks were:

**Mortality**

Ration 1 (containing protein supplement A)—6 per cent.

Ration 2 (containing protein supplement B)—3 per cent.

Ration 3 (containing protein supplement C)—8 per cent.

Ration 4 (containing protein supplement D)—2 per cent.

In none of the chicks autopsied could any toxic fat or other toxicity symptoms be found.

These mortality rates are by no means high compared with industry figures and are low compared to the mortality percentages (48.7 per cent.) encountered by McDonald and Bielharz.

It can, therefore, be concluded that none or very little toxicity existed in any of the four fresh protein supplements, tested at the Poultry Research Station.

Further experiments will be carried out to determine whether storage under adverse conditions for long periods is detrimental and whether the addition of an anti-oxidant to the raw material will improve the nutritive qualities of some of the commonly-used protein supplements.

**ACKNOWLEDGMENT**

Grateful acknowledgment is made to the staff of the Poultry Research Station and in particular to Mr. B. Vale, for their assistance; also to Messrs. M. E. Nairn and I. J. Miller of the Animal Health Laboratories.

**REFERENCE**

McDonald, M. W., and Bielharz, R. G.—The Toxic Factors in Low Quality Poultry Meatmeals.
Since 1914 one thing has never changed . . .

Dodge

Dependability!

Naturally, there have been many changes since the first Dodge truck came off the assembly line a half-century ago—but what hasn't changed is, that, every year, Dodge has set the pace in truck design, performance and dependability.

Recent additions of a new 129" W.B. 1 tonner, a new 153" W.B. 2 tonner, new 175" W.B. 3 tonner, new 190" W.B. 6 tonner; also the new 133 B.H.P. Premium Duty Slant Six engine, and now a proven Diesel engine for the popular Six Series Models confirm Dodge leadership in the trucking field.

NOW DIESEL POWERED

DODGE '6' SERIES WITH THE

WELL PROVEN PERKINS

354 cu. in. DIESEL ENGINE


CHRYSLER AUSTRALIA LTD.