



**REPORT ON THE EFFICACY OF ENZYMATIC PRODUCT  
« ENDOFEED DC» (ENDO-1, 3 (4)-BETA-GLUCANASE AND ENDO-1, 4-BETA-XYLANASE  
PRODUCED BY *ASPERGILLUS NIGER*) IN LAYING HENS**

(Adopted on 21 April 2003)

## 1. BACKGROUND

The product “Endofeed DC” (endo-1, 3 (4)-beta-glucanase and endo-1, 4-beta-xylanase produced by *Aspergillus niger*), is already provisionally authorised for the use as feed additive for the animal category “laying hens” until 30 June 2004. The applicant claims that the enzyme preparation, when added at the suitable dose to the appropriate feeds, improves significantly laying hen efficiency, and in particular egg size and weight.

The Commission received a request for a permanent Community authorisation for this animal category under the conditions set out in the following table:

Table 1

| Additive                                 | Chemical formula, description   | Species or category of animal | Minimum content                      | Maximum content | Other provisions  |
|--|---|-------------------------------|--------------------------------------|-----------------|---|
|  |   |                               | CFU/kg of complete feedingstuff      |                 |   |
| Enzymes                                  |   |                               |                                      |                 |   |
| Endo-1,3(4)-beta-glucanase<br>EC 3.2.1.6 | Preparation of Endo-1,3(4)-beta-glucanase and Endo-1,4-beta-xylanase produced by <i>Aspergillus niger</i> ( <i>phoenicis</i> ) (NRRL 25541) having a minimum activity of:<br>Endo-1,3(4)-beta-glucanase: 1100 IU <sup>1</sup> /g<br>Endo-1,4-beta-xylanase: 1600 IU <sup>2</sup> /g | Laying hens                   | Endo-1,3(4)-beta-glucanase<br>138 IU | -               | Recommended dose per kilogram of complete feedingstuff:<br>• Endo-1,3(4)-beta-glucanase: 138 IU<br>• Endo-1,4-beta-xylanase: 200 IU<br><br>For use in compound feeds rich in non-starch polysaccharides |
| Endo-1,4-beta-xylanase<br>EC 3.2.1.8     |   |                               | Endo-1,4-beta-xylanase<br>200 IU     |                 |   |

<sup>1</sup> 1 IU is the amount of enzyme which liberates 1 micromole of reducing sugars (glucose equivalents) from oat beta-glucan per minute at pH 4.0 and 30°C

<sup>2</sup> 1 IU is the amount of enzyme which liberates 1 micromole of reducing sugars (xylose equivalents) from oat xylan per minute at pH 4.0 and 30°C

## 2. TERMS OF REFERENCE

The Scientific Committee for Animal Nutrition (SCAN) is requested to advise the Commission on the efficacy of the product " Endofeed DC" when used as a feed additive in feedingstuffs, under the conditions proposed by the Company (see table 1).

## 3. OPINION OF THE COMMITTEE

### 3.1. History

Endofeed DC<sup>®</sup> is an enzymatic product with two declared enzymatic activities. This product proposed for use in chickens for fattening and laying hens was already the subject of SCAN evaluations. The outcome of these evaluations was satisfactory and led to the addition of the product in the "*SCAN report on the use of certain enzymes in animal feedingstuffs*" on 25 January 1999.

The SCAN is not aware of any more recent information that would require a re-evaluation of its opinion on the safety of the product. Consequently the present opinion deals only with issues related to efficacy.

### 3.2. Studies concerning the efficacy of the product "Endofeed DC" in laying hens

Four experiments were conducted to determine the efficacy of Endofeed DC<sup>®</sup> in laying hens at four different locations in 2001.

A total of 1170 (Study 1), 400 (Study 2), 600 (Study 3) and 360 (Study 4) laying hens were used. Hens were fed diets based on barley, wheat and soya allocated to one of two (Study 2) or three (Study 1, 3, 4) treatments: Group 1: negative control (0), Group 2 with 100 ppm and Group 3 with 125 ppm Endofeed DC<sup>®</sup> (Recommended dosage) (Table 2). Group 2 was not further considered as the level of inclusion is below the minimum recommended dose.

Table 2: Experimental design

| Study | Dose Endofeed DC | Replicates per treatment | Hens per replicate | Age weeks |
|-------|------------------|--------------------------|--------------------|-----------|
| 1     | 0 / 100 / 125    | 26                       | 15                 | 30 - 54   |
| 2     | 0 / 125          | 10                       | 20                 | 34 - 58   |
| 3     | 0 / 100 / 125    | 10                       | 20                 | 22 - 46   |
| 4     | 0 / 100 / 125    | 8                        | 15                 | 45 - 69   |

Concentrations of the active substances in the mash feeds were analyzed in two laboratories in every study. Laboratories found respectively a recovery rate of 60 % to 138 % for  $\beta$ -glucanase, and of 70 % to 144 % for xylanase (Table 3). The analytical results in Study 1 and Study 3 did not correlate well with the doses of Endofeed DC added to the feed. But in these studies, the efficacy results showed that enzymes were present in sufficient quantities.

Table 3: Feed enzyme recovery

| Study | Dose Endofeed DC | $\beta$ -glucanase % recovery | Xylanase % recovery |
|-------|------------------|-------------------------------|---------------------|
| 1     | 125              | 60 – 63                       | 70 - 80             |
| 2     | 125              | 94 – 114                      | 110 - 126           |
| 3     | 125              | 68 – 132                      | 81 - 144            |
| 4     | 125              | 103 – 138                     | 110 - 144           |

Improved performance and feed conversion of the hens was determined on the basis of feed intake (g/hen), laying intensity (%), egg weight (g/egg) and daily egg mass production (g/hen) over the whole period in Study 1 to Study 4 (Table 4).

Table 4: Laying performance and feed conversion (P<0.05)

| Study | Dose Endofeed DC | Feed intake g/day | Laying intensity % | Egg weight g/egg | Daily egg mass g/hen | Feed conversion g feed/g egg mass |
|-------|------------------|-------------------|--------------------|------------------|----------------------|-----------------------------------|
| 1     | 0                | 115.4             | 84.9               | 66.6             | No details           | 2.05 a                            |
|       | 125              | 115.0             | 85.6               | 67.4             |                      | 2.00 b                            |
| 2     | 0                | 118.8             | 91.8               | 68.5 a           | 62.9                 | 1.89                              |
|       | 125              | 118.8             | 91.4               | 69.7 b           | 63.7                 | 1.87                              |
| 3     | 0                | 116.4             | 90.8               | 62.0             | 56.3                 | 2.07                              |
|       | 125              | 115.9             | 89.8               | 62.9             | 56.5                 | 2.05                              |
| 4     | 0                | 117.8             | 85.5               | 66.1 a           | 61.8                 | 1.89                              |
|       | 125              | 118.7             | 87.5               | 68.6 b           | 64.2                 | 1.87                              |

a,b – Values in columns with different superscripts differ significantly

Supplementing the diet with 125 ppm Endofeed DC<sup>®</sup> significantly improved the feed conversion compared with the control group (Study 1) but had no effect on feed intake, on laying intensity and on daily egg mass production in all studies.

The most consistent effect on egg quality was observed in relation to egg weight (g/egg). In Study 2 and 4 supplementing the diet with 125 ppm Endofeed DC<sup>®</sup> significantly improved the mean egg weight compared with the control group.

Supplementing the diets with 125 ppm Endofeed DC<sup>®</sup> significantly improved yolk colour in Study 1 for the overall period and in Study 2 by 58 weeks of age.

In Study 3, hens fed Endofeed DC at 125 ppm laid a significantly higher percentage of cleaner eggs and higher percentage of eggs in heavier egg classes compared with the control group over the whole study period.

### 3.3. Conclusion

On the basis of the data submitted, it can not be concluded that Endofeed DC<sup>®</sup> was constantly efficacious in laying hens, after inclusion of the recommended dose in complete feedingstuff (Endo-1,3(4)-beta-glucanase: 138 IU, Endo-1,4-beta-xylanase: 200 IU). A minimum of three studies demonstrating a statistically significant (P<0.05) improvement of important characteristics (daily egg mass, feed conversion, percentage of cleaner eggs) should be provided.