



## EUROPEAN COMMISSION

HEALTH & CONSUMER PROTECTION DIRECTORATE-GENERAL

Directorate C - Scientific Opinions

**C2 - Management of scientific committees; scientific co-operation and networks**

### Opinion of the Scientific Committee on Animal Nutrition on the use of certain enzymes in animal feedingstuffs

(Adopted 4 June 1998, updated 16 October 2002)

Note: This opinion concerns only the products with complete files (see annex). In other cases the opinion is awaiting further comments from the applicant firms. For the complete list of enzymes with national authorisations, which are included in this question, see Commission Information Procedure 96/263/03 (O.J. C 263, 11.09.96, p.3)

#### **1. TERMS OF REFERENCE (SEPTEMBER 1996)**

The Scientific Committee for Animal Nutrition is requested to give an opinion on the following questions:

1. Is the use of the enzymes indicated in the annexed list, as feedingstuff additives, safe to corresponding animal species under the conditions proposed?
2. Do the toxicology studies allow to conclude that the proposed use does not present risks to the consumer, the user or to the animals?
3. In the light of the answers to the above-mentioned questions, are the proposed conditions of use acceptable?

#### **2. BACKGROUND**

- 1 Certain enzymes and their preparations are used in animal nutrition in order to improve the digestibility of nutrients or to stabilize the flora of the digestive system of animals and to reduce the quantity of certain environmentally undesirable substances.
2. The Council, by adopting Directive 93/114/EC<sup>1</sup>, allowed the inclusion of enzymes in Directive 70/524/EEC<sup>2</sup>. Consequently, the same requirements which apply to the authorization of additives and to manufacturers in general also apply to them.

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<sup>1</sup> Concerning the use and marketing of enzymes, micro-organisms and their preparations in animal nutrition (O.J. No. L 334, 31/12/93, p. 24)

<sup>2</sup> O.J. No. L 270, 14/12/70, p.1., as amended by Council Directive 84/587/EEC (O.J. No. L 319, 08/12/84, p.13.)

According to Article 2 (1) of Council Directive 93/113/EC<sup>3</sup> and by derogation to Directive 70/524/EEC, Member States were allowed to temporarily use and market enzymes and their preparations in animal nutrition within their territory, provided that, on the basis of the information available, the products do not present a danger to human or animal health, and that they are included in a national list.

The Member States agreed to forward the national list of authorised products to the Commission and to other Member States as well as the information provided by the persons responsible for putting these products on the market. Before 1 January 1997, following the provisions of Article 5 of Directive 93/113/EC, a ruling should be given on the enzymes or preparations which are manufactured by them and which are part of the national lists.

3. The enzymes indicated in the annexed list are part of the national list of products provided to the Commission by Member States, pursuing Article 3 (b) of Council Directive 93/113/EC. These products are currently marketed in the Member States. Safety is the major concern of the Commission.
4. The enzyme issues were discussed at the 101st, 102nd and 103rd SCAN meetings. It was agreed to form an *ad hoc* working group to rapidly review the registration files which are considered admissible in regard to the prerequisite of Directive 93/113/EC. The objective is to rule out any potential safety concerns before a possible entry into annex II.

#### **Further background (27 May 1997)**

In May 27 1997, further to the background provided with question 86 the Scientific Committee for Animal Nutrition was requested to also consider the following terms of reference:

*What are the minimum requirements of the tolerance test in order to correctly assess the safety of use of enzymes containing additives in the target species?*

As a background it was indicated that Section IV§1.1 of Council Directive 87/153/EEC fixing guidelines for the assessment of additives in animal nutrition indicates that a tolerance test must be performed on the target species. However, the conditions under which the test must be performed (i.e. duration of the test, concentration of the additive in feeding stuffs,) were not elaborated upon.

At the May 22-23 1997 meeting of the Standing Committee for Animal Nutrition, clarification was requested on the minimum requirements that a tolerance test must fulfill to ensure target animal safety in view of the present lack of detailed guidance in the guidelines on this particular point for this relatively new group of additives.

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<sup>3</sup> Concerning the use and marketing of enzymes, micro-organisms and their preparations in animal nutrition, O.J. No. L 334, 31/12/93, p17

### 3. OPINION OF THE COMMITTEE

Since not all the dossiers were complete and additional information is still being received, this opinion is based on the scientific information available at this stage. The list of enzymes where the evaluation has been completed is given in the annex.

1. The Committee considers that the enzymes in the annexed list are safe to corresponding animal species under the conditions proposed. Moreover, enzymes as such are protein catalysts known to be widely distributed in nature and industrially used for several purposes in food processing, with a long history of safe use.

The enzymes of the annexed list are produced by well known non pathogenic strains, and they are qualitatively and quantitatively analyzed regarding the major catalytic activity and the absence of impurities and contaminants including micro-organisms, mycotoxins, heavy metals and antimicrobials.

2. Safety to the animals: Tolerance tests were generally well performed at levels of at least 10 times the maximum proposed concentration. No significant negative clinical or histo-pathological changes were observed in the experimental animals. Since enzymes are proteins, they are digested and metabolised as any other dietary protein, and therefore no risk can be expected.

Safety to the users (workers and feedmakers): The enzymes under evaluation, as foreign proteins to the human body, have the ability to induce an immune response which may result in hypersensitivity. This problem has been tackled and adequately solved in other industrial areas, such as detergents, food and textiles. Moreover, in account of the above-mentioned risk, it is assumed that appropriate measures for labeling are enforced, according to existing directives.

Safety to the consumers: Since enzymes are proteins, products of animal origin produced from feed with enzyme preparations do not themselves contain any content of enzyme preparation. They are therefore safe for the consumer.

3. The proposed conditions of use evaluated so far are acceptable as regards safety to consumers, users and animals.

However, the present recommended doses are based on enzyme activity determinations, using a number of different methods which are not really comparable. The Committee therefore recommends that specialists develop harmonized assays for each enzymatic activity to be determined.

The Committee considers the evaluated enzyme preparations produced by GMO as safe. When production strains contain a resistance marker gene its absence in the final product must be verified and this has been done for the products listed in the annex. In addition, these types of marker genes must be avoided or removed in the future.

#### 4. GENERAL REMARKS

Further to the above mentioned opinion, the Committee raised the following points which are relevant to Commission Directive 87/153/EEC, fixing guidelines for the assessment of additives in animals, last amended by Directive 95/11/EC<sup>4</sup>

- 1 Toxicity studies: When the production strain has been modified or when the substrates used for the manufacturing process have been essentially changed, toxicity studies should be considered.
- 2 Operator safety: In the light of previous discussions within SCAN on enzymes and worker safety, and in the absence of information to demonstrate that an enzyme product has very low or no sensitisation potential, it should be assumed that worker sensitisation may occur and therefore protective measures should be taken:
3. Access to data on food enzymes: The Committee considers that compared to feedstuffs inclusion of enzymes in food is widely practiced as a technological aid, therefore it would be of great advantage to have access to:
  - The list of enzymes, their origin and approved uses in food;
  - Scientific information used to assess user and consumer safety; a systematic consolidation of consumers safety.
  - The European requirements for the clearance of food enzymes
4. Enzyme activity determination: The Committee discussed the general problem of enzymatic activity determination in enzymes preparation and in feed and the difficulty encountered in evaluating a number of dossiers due to the variability of the methods used. The need to develop harmonised methods at Community level will be considered by the CEMA group.

#### 5. REFERENCES

Individual files provided by applicant firms. For complete list of enzymes authorised in the Members States list of enzymes, micro-organisms and their preparations in animal nutrition permitted for use in individual Member States. Commission Information Procedure 96/263/03 (O.J. C 263, 11.09.96, p.3)

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<sup>4</sup> OJ No. L 106, 11/05/95 p. 23

## Annex

**Part A.** The Scientific Committee on Animal Nutrition concludes on the basis of the information provided and knowing of no adverse reports elsewhere that the following enzyme preparations are safe for use as feed additives when used according to the manufacturers instructions and with the animal categories specified. The Committee also concludes that these enzyme preparations pose no risk to the wider environment, to those handling the preparations, or to individuals of any age consuming products derived from animals fed the enzyme-treated feed.

### **I. ADDITIVES WITH A SINGLE DECLARED ENZYMATIC ACTIVITY**

<b>3 – Phytase (EC 3.1.3.8)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Natuphos 5000	<i>Aspergillus niger</i>	CBS 114.94	Piglets, sows and pigs for fattening Chickens for fattening and laying hens
Phytase	<i>Aspergillus oryzae</i>	DSM 10 289	Piglets and pigs for fattening Chickens for fattening and laying hens
Finase	<i>Trichoderma longibrachiatum</i>	CBS 528.94	Piglets and pigs for fattening Chickens for fattening

<b>Phosphoric monoester hydrolase-Phytase (EC 3.1.3.26)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Biofeed Phytase	<i>Aspergillus oryzae</i>	DSM 11 857	Piglets and pigs for fattening Chickens for fattening, laying hens and turkeys for fattening

<b>Endo 1,3 (4) - Beta glucanase (EC 3.2.1.6)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Allzyme BG	<i>Trichoderma viride</i>	CBS 517.94	Chickens for fattening
Avizyme 1110, Porzyme 8110 et 9110	<i>Trichoderma longibrachiatum</i>	ATCC 2106	Piglets and pigs for fattening Chickens for fattening
Econase Barley	<i>Trichoderma reesei</i>	CBS 526.94	Piglets Chickens for fattening
Energex	<i>Aspergillus aculeatus</i>	CBS 589.94	Piglets
Feedlyve AGL (L,P/P) Rovabio Beta - glucanase	<i>Aspergillus niger</i>	MUCL 39 199	Chickens for fattening
Hostazym C	<i>Trichoderma longibrachiatum</i>	IMI 142	Piglets and pigs for fattening Chickens for fattening and laying hens
Rovabio Beta -glucanase GEP	<i>Geosmithia (Penicillium) emersonii</i>	IMI 133	Chickens for fattening
Safizym GP, GL	<i>Trichoderma longibrachiatum</i>	CNCM MA 6-10 W	Chickens for fattening

<b>Endo 1,4 - Beta xylanase (EC 3.2.1.8)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Avizyme 1310, 2300 et 2310 Porzyme 8310, 9300 et 9310	<i>Trichoderma longibrachiatum</i>	ATCC 2105	Piglets and pigs for fattening Chickens for fattening and laying hens
Belfeed B 1100 MP	<i>Bacillus subtilis</i>	BCCM LMG s-15136	Chickens for fattening Piglets
Biofeed Wheat	<i>Aspergillus oryzae</i>	DSM 10 287	Piglets Chickens for fattening and turkeys for fattening
Feedlyve AXC (L/L,P/P) Rovabio Xylanase	<i>Trichoderma longibrachiatum</i>	MUCL 39 203	Chickens for fattening
Hostazym X	<i>Trichoderma longibrachiatum</i>	IMI 135	Piglets and pigs for fattening Chickens for fattening and laying hens
Porzyme 9305	<i>Trichoderma longibrachiatum</i>	IMI 135	Piglets and pigs for fattening
Lyxasan Forte	<i>Aspergillus niger</i>	CBS 270.95	Laying hens and

			turkeys for fattening
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Endo 1,4 - Beta xylanase (EC 3.2.1.8)		(continued)	
Novozym 431	<i>Trichoderma longibrachiatum</i>	CBS 592.94	Chickens for fattening
Novozym 578	<i>Aspergillus oryzae</i>	DSM 10 288	Chickens for fattening
Rovabio Xylanase	<i>Trichoderma longibrachiatum</i>	MUCL 39 203	Chickens for fattening
Safizym XP, XL	<i>Trichoderma longibrachiatum</i>	CNCM MA / 6-10 W	Chicken for fattening, laying hens and turkeys for fattening
Volible P,L	<i>Trichoderma longibrachiatum</i>	CBS 614.94	Chickens for fattening and laying hens

Alpha-Galactosidase (EC 3.2.1.22)			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Alpha Gal	<i>Aspergillus oryzae</i>	DSM 10 286	Chickens for fattening

Xylan 1,4 – Beta xylosidase (EC 3.2.1.37)			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Allzyme PT	<i>Aspergillus niger</i>	CBS 520.94	Chickens for fattening

Aspergillopepsin I (EC 3.4.23.18)			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Allzyme P F	<i>Aspergillus niger</i>	CBS 519.94	Chickens for fattening,

Oryzin (EC 3.4.21.63)			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Panstimase	<i>Streptomyces fradiae</i>	CNCM I – 1504	Piglets, sows and pigs for fattening

In the case of the product Panstimase, although SCAN recognises that this product satisfies the requirements for safety of use of enzymes, the Committee draws the attention on the contamination of this product with Neomycin originating from the strain involved. SCAN is of the opinion that use of strains producing antibiotics used in humans or animals is highly undesirable and could pose a risk.

## II. ADDITIVES WITH TWO DECLARED ENZYMATIC ACTIVITIES

Endo 1,4 – Beta glucanase (EC 3.2.1.4) Endo 1,4 – Beta xylanase (EC 3.2.1.8)			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Biofeed Plus	<i>Humicola insolens</i>	DSM 10442	Piglets Chickens for fattening
Grindazym GV	<i>Aspergillus niger</i>	CBS 600.94	Piglets Chickens for fattening and laying hens
Grindazym GP, GPL	<i>Aspergillus niger</i>	CBS 600.94	Chickens for fattening, laying hens and turkeys for fattening

Endo 1,3 (4) - Beta glucanase (EC 3.2.1.6) Endo 1,4 - Beta xylanase (EC 3.2.1.8)			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Avizyme 1210	<i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i>	ATCC 2105 ATCC 2106	Chickens for fattening
Avizyme 2100	<i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i>	ATCC 2105 ATCC 2106	Laying hens
Porzyme 9100	<i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i>	ATCC 2105 ATCC 2106	Pigs for fattening
Avizyme SX	<i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i>	ATCC 2106 IMI 135	Chickens for fattening
Natugrain-Barlican	<i>Trichoderma longibrachiatum</i>	CBS 357.94	Chickens for fattening, laying hens and turkeys for fattening
Quatrazyme HP=	<i>Aspergillus niger</i>	CNCM I-1517	Chickens for fattening
Rovabio Excel LC/AP	<i>Penicillium funiculosum</i>	IMI 101	Pigs for fattening Chickens for fattening, laying hens and turkeys for fattening
Endofeed, DC	<i>Aspergillus niger</i>	CCFC-DAOM 221137	Chickens for fattening and laying hens
Econase Wheat	<i>Trichoderma reesei</i> <i>Trichoderma reesei</i>	CBS 526.94 CBS 529.94	Piglets Chickens for fattening
Wheatzyme	<i>Trichoderma reesei</i> <i>Trichoderma reesei</i>	CBS 526.94 CBS 529.94	Piglets and pigs for fattening Chickens for fattening and laying hens



### III. ADDITIVES WITH THREE DECLARED ENZYMATIC ACTIVITIES

<p style="text-align: center;"><b>Alpha- Amylase (EC 3.2.1.1)</b></p> <p style="text-align: center;"><b>Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)</b></p> <p style="text-align: center;"><b>Endo 1,4 - Beta xylanase (EC 3.2.1.8)</b></p>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Amylofeed	<i>Aspergillus niger</i> <i>Aspergillus oryzae</i>	NRRL 25 541 ATCC 66 222	Piglets

<p style="text-align: center;"><b>Endo 1,4 – Beta glucanase (EC 3.2.1.4)</b></p> <p style="text-align: center;"><b>Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)</b></p> <p style="text-align: center;"><b>Endo 1,4 – Beta xylanase (EC 3.2.1.8)</b></p>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Roxazyme G	<i>Trichoderma viride</i>	NIBH FERM / BP 447	Chickens for fattening and laying hens Turkeys for fattening
Roxazyme G2 Liquid Roxazyme G2 Granular	<i>Trichoderma longibrachiatum</i>	ATCC 74 252	Chickens for fattening Turkeys for fattening

<p style="text-align: center;"><b>Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)</b></p> <p style="text-align: center;"><b>Endo 1,4 – Beta xylanase (EC 3.2.1.8)</b></p> <p style="text-align: center;"><b>Polygalacturonase (EC 3.2.1.15)</b></p>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Porzyme SF 100	<i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i> <i>Aspergillus aculeatus</i>	ATCC 2106 IMI 135 CBS 589.94	Pigs for fattening

**Part B.** The Scientific Committee on Animal Nutrition concludes on the basis of the information provided that the safety for the animal categories specified, the wider environment, those handling the preparations, or to individuals of any age consuming products derived from animals fed the enzyme-treated feed, of the following enzyme preparation(s), is not demonstrated for use as feed additives when used according to the manufacturers instructions.

Lysozyme-HCl (EC 3.2.1.17) Peroxidase (EC 1.11.1.7).			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Lisovit E	None	None	Broilers  Piglets

**Part C.** The following enzymatic products are produced from various *Bacillus* strains, which need additional tests for detection of possible toxin production.

**I. ADDITIVES WITH A SINGLE DECLARED ENZYMATIC ACTIVITY**

<b>Alpha-Amylase (EC 3.2.1.1)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Vevozyme	<i>Bacillus amyloliquefaciens</i>	CBS 360.94	Piglets, pigs for fattening and sows

<b>Subtilisin (EC 3.4.21.62)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Biofeed Pro	<i>Bacillus licheniformis</i>	DSM 9552	Chickens for fattening Piglets and pigs for fattening

**II. ADDITIVES WITH TWO DECLARED ENZYMATIC ACTIVITIES**

<b>Alpha-Amylase (EC 3.2.1.1) Endo 1,3 (4) - Beta glucanase (EC 3.2.1.6)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Biofeed Alpha	<i>Bacillus amyloliquefaciens</i>	DSM 9553	Piglets Chickens for fattening and turkeys for fattening

<b>Alpha Amylase (EC 3.2.1.1) Endo 1,4 - Beta xylanase (EC 3.2.1.8)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Biofeed Beta	<i>Humicola insolens</i> <i>Bacillus amyloliquefaciens</i>	DSM 10442 DSM 9553	Chickens for fattening

Endo 1,4 - Beta xylanase (EC 3.2.1.8)			
Bacillolysin (EC 3.4.21.62)			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Avizyme 1300	<i>Trichoderma longibrachiatum</i> <i>Bacillus subtilis</i>	ATCC 2105 ATCC 2107	Chicken for fattening and turkeys for fattening
Porzyme 8300	<i>Trichoderma longibrachiatum</i> <i>Bacillus subtilis</i>	ATCC 2105 ATCC 2107	Piglets

### III. ADDITIVES WITH THREE DECLARED ENZYMATIC ACTIVITIES

Alpha- Amylase (EC 3.2.1.1)			
Endo 1,4 – Beta glucanase (EC 3.2.1.4)			
Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Kemzyme Liquid	<i>Bacillus amyloquefaciens</i> <i>Trichoderma reesei</i> <i>Aspergillus aculeatus</i>	DSM 9553 CBS 592.94 CBS 589.94	Pigs for fattening Chickens for fattening.

Alpha- Amylase (EC 3.2.1.1)			
Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)			
Endo 1,4 - Beta xylanase (EC 3.2.1.8)			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and Accession number</u>	<u>Target animal categories</u>
Porzyme 8100	<i>Bacillus amyloliquefaciens</i> <i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i>	DSM 9553 ATCC 2105 ATCC 2106	Piglets
Porzyme SP	<i>Bacillus amyloliquefaciens</i> <i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i>	DSM 9553 ATCC 2106 IMI 135	Piglets
Porzyme TP 100G	<i>Bacillus amyloliquefaciens</i> <i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i>	DSM 9553 ATCC 2106 IMI 135	Piglets

Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)			
Endo 1,4 – Beta xylanase (EC 3.2.1.8)			

<b>Bacillolysin (EC 3.4.21.62)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Avizyme 1100, 1200	<i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i> <i>Bacillus subtilis</i>	ATCC 2105 ATCC 2106 ATCC 2107	Chicken for fattening
Avizyme 1200	<i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i> <i>Bacillus subtilis</i>	ATCC 2105 ATCC 2106 ATCC 2107	Chicken for fattening and laying hens

#### IV. ADDITIVES WITH FOUR DECLARED ENZYMATIC ACTIVITIES

<b>Alpha- Amylase (EC 3.2.1.1)</b>			
<b>Endo 1,4 – Beta glucanase (EC 3.2.1.4)</b>			
<b>Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)</b>			
<b>Bacillolysin (EC 3.4.24.28)</b>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Kemzyme Dry	<i>Bacillus amyloquefaciens</i> <i>Trichoderma reesei</i> <i>Aspergillus aculeatus</i> <i>Bacillus amyloliquefaciens</i>	DSM 9553 CBS 592.94 CBS 589.94 DSM 9554	Piglets and pigs and for fattening Chickens for fattening and laying hens.
Kemzyme B dry	<i>Bacillus amyloquefaciens</i> <i>Trichoderma reesei</i> <i>Aspergillus aculeatus</i> <i>Bacillus amyloliquefaciens</i>	DSM 9553 CBS 592.94 CBS 589.94 DSM 9554	Piglets Chickens for fattening.
Kemzyme PS dry	<i>Bacillus amyloquefaciens</i> <i>Trichoderma reesei</i> <i>Aspergillus aculeatus</i> <i>Bacillus amyloliquefaciens</i>	DSM 9553 CBS 592.94 CBS 589.94 DSM 9554	Piglets
Kemzyme HF dry	<i>Bacillus amyloquefaciens</i> <i>Trichoderma reesei</i> <i>Aspergillus aculeatus</i> <i>Bacillus amyloliquefaciens</i>	DSM 9553 CBS 592.94 CBS 589.94 DSM 9554	Pigs for fattening Chickens for fattening.

<p style="text-align: center;"><b>Alpha- Amylase (EC 3.2.1.1)</b></p> <p style="text-align: center;"><b>Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)</b></p> <p style="text-align: center;"><b>Endo 1,4 - Beta xylanase (EC 3.2.1.8)</b></p> <p style="text-align: center;"><b>Polygalacturonase (EC 3.2.1.15)</b></p>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Porzyme TP 100	<i>Bacillus amyloliquefaciens</i> <i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i> <i>Aspergillus aculeatus</i>	DSM 9553 ATCC 2106 IMI 135 CBS 589.94	Piglets

<p style="text-align: center;"><b>Alpha- Amylase (EC 3.2.1.1)</b></p> <p style="text-align: center;"><b>Endo 1,4 - Beta xylanase (EC 3.2.1.8)</b></p> <p style="text-align: center;"><b>Polygalacturonase (EC 3.2.1.15)</b></p> <p style="text-align: center;"><b>Bacillolysin (EC 3.4.21.62)</b></p>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Avizyme 1500*	<i>Bacillus amyloliquefaciens</i> <i>Trichoderma longibrachiatum</i> <i>Aspergillus aculeatus</i> <i>Bacillus subtilis</i>	DSM 9553 ATCC 2105 CBS 589.94 ATCC 2107	Chicken for fattening and turkeys for fattening

\* : SCAN underlines that, in the case of Avizyme 1500, an additional activity is present (Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)) but not declared.

**V. ADDITIVES WITH FIVE DECLARED ENZYMATIC ACTIVITIES**

<p><b>Alpha- Amylase (EC 3.2.1.1)</b></p> <p><b>Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)</b></p> <p><b>Endo 1,4 - Beta xylanase (EC 3.2.1.8)</b></p> <p><b>Polygalacturonase (EC 3.2.1.15)</b></p> <p><b>Bacillolysin (EC 3.4.24.28)</b></p>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Avizyme TX	<i>Bacillus amyloliquefaciens</i> <i>Trichoderma longibrachiatum</i> <i>Trichoderma longibrachiatum</i> <i>Aspergillus aculeatus</i> <i>Bacillus amyloliquefaciens</i>	DSM 9553 ATCC 2106 IMI 135 CBS 589.94 DSM 9554	Chicken for fattening and laying hens

<p><b>Alpha- Amylase (EC 3.2.1.1)</b></p> <p><b>Endo 1,4 – Beta glucanase (EC 3.2.1.4)</b></p> <p><b>Endo 1,3 (4) – Beta glucanase (EC 3.2.1.6)</b></p> <p><b>Endo 1,4 - Beta xylanase (EC 3.2.1.8)</b></p> <p><b>Bacillolysin (EC 3.4.24.28)</b></p>			
<u>Name</u>	<u>Strain involved</u>	<u>Culture collection and accession number</u>	<u>Target animal categories</u>
Kemzyme W Dry and W Liquid	<i>Bacillus amyloliquefaciens</i> , <i>Trichoderma reesei</i> , <i>Aspergillus aculateus</i> , <i>Trichoderma viride</i> , <i>Bacillus amyloliquefaciens</i>	DSM 9553 CBS 592.94 CBS 589.94 NIBH FERM BP 4842 DSM 9554	Piglets and pigs for fattening Chickens for fattening and laying hens. Turkeys for fattening