

Safety Assessment on the Safety and Efficacy of an Endo-1,4-beta-xylanase (ECONASE® XT) as a Feed Additive for Use in Laying Hens, Minor Poultry Species Other Than Laying Birds, Laying Birds of Minor Poultry Species and Pigs for Fattening (RP1366)

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FSA Research and Evidence

An application was submitted to the Food Standards Agency (FSA) and Food Standards Scotland (FSS) in November 2021 from Roal Oy ('the applicant') for the new authorisation of an additive containing an endo-1,4-beta-xylanase produced by *Trichoderma reesei* CBS 114044 (ECONASE® XT), under the category of 'zootechnical additives' and functional group 'digestibility enhancers'. The additive is proposed to be used at an inclusion rate of 12,000 – 24,000 BXU/kg complete feed for laying hens, 8,000 – 24,000 BXU/kg feed for minor poultry species other than laying birds, 24,000 BXU/kg feed for laying birds of minor poultry species and 20,000 – 24,000 BXU/kg feed for pigs for fattening.

To support the FSA and Food Standards Scotland (FSS) in evaluating the dossier, the Advisory Committee on Animal Feedingstuffs (ACAF) were asked to review the dossier and the supplementary information from the applicant.

The FSA/FSS concluded, based on the ACAF's advice, that all five forms of the additive and the production strain were correctly characterised. The liquid and solid forms of the additive are stable for 24 months at 25 °C and 20-23 °C, respectively. The solid forms are stable for pelleting to 95 °C for 32-33 seconds and in a premixture for 6 months. All forms of the additive are stable in pelleted and mash feed for 3 months and capable of homogenous distribution in feed.

ECONASE® XT can be considered safe for the target species, consumers and the environment. All forms of the additive are considered non-irritating to skin and eyes and are not skin sensitisers but are potential respiratory sensitisers.

The additive is efficacious in laying hens, minor poultry species other than laying birds, laying birds of minor poultry species and pigs for fattening.

The views of ACAF have been taken into account in the safety assessment which represents the opinion of the FSA and FSS.

1. Introduction

The FSA and FSS have undertaken an assessment for a feed additive containing endo-1,4-beta-xylanase (ECONASE® XT, Roal Oy, Tykkimäentie 15b, 05200 Rajamäki, Finland) under assimilated Regulation (EC) No 1831/2003 (EC, 2003). The application was submitted as a new authorisation in the category 'zootechnical additives', functional group 'digestibility enhancers', for its use in laying hens, minor poultry species other than laying birds, laying birds of minor poultry species and pigs for fattening ([Table 1](#)). The additive is currently authorised in Great Britain (GB) for use in weaned piglets, chickens for fattening, chickens reared for laying, turkeys for fattening and turkeys reared for breeding (4a8i).

To support the safety assessment by FSA and FSS, the ACAF provided advice to the FSA and FSS outlined in this document.

In line with Article 8 of 1831/2003, the assessment process has considered and concluded that the feed additive complies with the conditions laid down in Article 5, including: safety considerations for human, animal and environmental health; efficacy of the additive for its intended effect; potential impairment of the distinctive features of animal products. This, and the guidance put in place by EFSA for the evaluation of feed additive applications, has formed the basis and structure for the assessment.

The dossier was evaluated by ACAF at their June 2024 meeting, after which a request for information was communicated to the applicant. The response to this request was provided in July 2024 and was reviewed by the ACAF at their September 2024 meeting.

The views of ACAF have been taken into account in this safety assessment which represents the opinion of the FSA/FSS.

Table 1. Products included in this assessment

Title	Product type	Intended use/s	Intended species of categories of animals
Endo-1,4-beta-xylanase (ECONASE® XT) produced by <i>Trichoderma reesei</i> CBS	Feed additive	Zootechnical additive	Laying hens, minor poultry species other than laying birds, laying birds of minor poultry species and pigs for

Title	Product type	Intended use/s	Intended species of categories of animals
114044			fattening

2. Assessment

2.1. Section II: Identity, characterisation and conditions of use

ECONASE® XT is an enzyme preparation produced by the genetically modified fungal strain *Trichoderma reesei* CBS 114044. The active substance is an endo-1,4-beta-xylanase that catalyses the breakdown of xylan. The activity of the enzyme is expressed in BXU/g, where one BXU is the amount of enzyme which liberates one nanomole per second of reducing sugars, expressed as xylose equivalents, from birch xylan at pH 5.3 and 50 °C.

There are three solid and two liquid forms of the additive ([Table 2](#)). The solid forms contain the active substance in a wheat flour carrier and a small quantity of sunflower oil. The liquid forms contain sorbitol and sodium benzoate in addition to the active substance in a carrier of water. The applicant provided data from multiple batches supporting the identity of each form of the additive ([Table 3](#) to [Table 7](#)).

Table 2. Forms of the additive

Name	Physical state	Minimum xylanase activity (BXU/g)
ECONASE® XT 25	Solid	160,000
ECONASE® XT 5 P	Solid	800,000
ECONASE® XT P	Solid	4,000,000
ECONASE® XT 25 L	Liquid	160,000
ECONASE® XT L	Liquid	400,000

Table 3. Identity of ECONASE® XT 25 (solid form)

Composition	
Xylanase activity	Min. 160,000 BXU/g
Chemical-physical specifications	
Appearance	Light brown powder
Particle size distribution	>250 µm – 10.9 % <63 µm – 15.4 % <1 µm – 0.0 %
Dusting potential	0 mg/m ³
Bulk density	0.61 – 0.68 kg/L
Impurities	
Total viable count	<1,000 CFU/g
Enterobacteriaceae	<10 CFU/g

Composition	
Coliforms	<10 CFU/g
<i>Escherichia coli</i>	Absent in 25 g
Yeasts	<1,000 CFU/g
Moulds	<1,000 CFU/g
Salmonella	Absent in 25 g
Arsenic	<0.5 mg/kg
Mercury	<0.05 mg/kg
Cadmium	<0.05 mg/kg
Lead	<0.05 mg/kg
Aflatoxin B1	<0.01 µg/kg
Aflatoxin B2	<0.01 µg/kg
Aflatoxin G1	<0.01 µg/kg
Aflatoxin G2	<0.01 µg/kg
Fumonisin B1	<20 µg/kg
Fumonisin B2	<20 µg/kg
Fumonisin B3	<20 µg/kg
Sterigmatocystin	<10 µg/kg
Ochratoxin A	<2 µg/kg
Deoxynivalenol	50 – 250 µg/kg
T2-toxin	<10 µg/kg
HT-2-toxin	<10 µg/kg
Zearalenone	<10 µg/kg

Table 4. Identity of ECONASE® XT 5 P (solid form)

Composition	
Xylanase activity	Min. 800,000 BXU/g
Chemical-physical specifications	
Appearance	Light brown powder
Particle size distribution	>250 µm – 9.1 % <63 µm – 18.7 % <1 µm – 0.0 %
Dusting potential	0 mg/m ³
Bulk density	0.59 – 0.63 kg/L
Impurities	
Total viable count	<1,000 CFU/g
Enterobacteriaceae	<10 CFU/g
Coliforms	<10 CFU/g
<i>Escherichia coli</i>	Absent in 25 g
Yeasts	<1,000 CFU/g
Moulds	<1,000 CFU/g
Salmonella	Absent in 25 g
Arsenic	<0.5 mg/kg
Mercury	<0.05 mg/kg
Cadmium	<0.05 mg/kg

Composition	
Lead	<0.05 mg/kg
Aflatoxin B1	<0.01 µg/kg
Aflatoxin B2	<0.01 µg/kg
Aflatoxin G1	<0.01 µg/kg
Aflatoxin G2	<0.01 µg/kg
Fumonisin B1	<20 µg/kg
Fumonisin B2	<20 µg/kg
Fumonisin B3	<20 µg/kg
Sterigmatocystin	<10 µg/kg
Ochratoxin A	<2 µg/kg
Deoxynivalenol	110 – 250 µg/kg
T2-toxin	<10 µg/kg
HT-2-toxin	<10 µg/kg
Zearalenone	<10 µg/kg

Table 5. Identity of ECONASE® XT P (solid form)

Composition	
Xylanase activity	Min. 4,000,000 BXU/g
Chemical-physical specifications	
Appearance	Brown powder
Particle size distribution	> 250 µm – 0.2 % < 63 µm – 38.1 % < 1 µm – 0.1 %
Dusting potential	22 - 93 mg/m ³
Bulk density	0.328 – 0.396 kg/L
Impurities	
Total viable count	< 1,000 CFU/g
Enterobacteriaceae	< 10 CFU/g
Coliforms	< 10 CFU/g
<i>Escherichia coli</i>	Absent in 25 g
Yeasts	< 1,000 CFU/g
Moulds	< 1,000 CFU/g
Salmonella	Absent in 25 g
Arsenic	≤ 0.5 mg/kg
Mercury	< 0.05 mg/kg
Cadmium	< 0.05 mg/kg
Lead	< 0.05 mg/kg
Aflatoxin B1	< 0.01 µg/kg
Aflatoxin B2	< 0.01 µg/kg
Aflatoxin G1	< 0.01 µg/kg
Aflatoxin G2	< 0.01 µg/kg
Fumonisin B1	< 20 µg/kg
Fumonisin B2	< 20 µg/kg
Fumonisin B3	< 20 µg/kg

Composition	
Sterigmatocystin	< 10 µg/kg
Ochratoxin A	< 2 µg/kg
Deoxynivalenol	< 20 – 84 µg/kg
T2-toxin	< 10 µg/kg
HT-2-toxin	< 10 µg/kg
Zearalenone	< 10 µg/kg

Table 6. Identity of ECONASE® XT 25 L (liquid form)

Composition	
Xylanase activity	Min. 160,000 BXU/g
Chemical-physical specifications	
Appearance	Clear brown liquid
Viscosity	3.909 mPa s at 20 °C 2.208 mPa s at 40 °C
Density	1.12 – 1.13 kg/L
pH	4.1 – 4.4
Impurities	
Total viable count	< 1,000 CFU/g
Enterobacteriaceae	< 10 CFU/g
Coliforms	< 1 CFU/g
<i>Escherichia coli</i>	Absent in 25 g
Yeasts	< 1,000 CFU/g
Moulds	< 1,000 CFU/g
Salmonella	Absent in 25 g
Arsenic	≤ 0.5 mg/kg
Mercury	< 0.05 mg/kg
Cadmium	< 0.05 mg/kg
Lead	< 0.05 mg/kg
Aflatoxin B1	< 0.1 µg/kg
Aflatoxin B2	< 0.1 µg/kg
Aflatoxin G1	< 0.1 µg/kg
Aflatoxin G2	< 0.1 µg/kg
Fumonisin B1	< 20 µg/kg
Fumonisin B2	< 20 µg/kg
Fumonisin B3	< 20 µg/kg
Sterigmatocystin	< 10 µg/kg
Ochratoxin A	< 2 µg/kg
Deoxynivalenol	< 20 µg/kg
T2-toxin	< 10 µg/kg
HT-2-toxin	< 10 µg/kg
Zearalenone	< 10 µg/kg

Table 7. Identity of ECONASE® XT L (liquid form)

Composition	
Xylanase activity	Min. 400,000 BXU/g
Chemical-physical specifications	
Appearance	Brown, aqueous liquid (may appear hazy)
Viscosity	6.170 mPa s at 20 °C 3.269 mPa s at 40 °C
Density	1.13 – 1.15 kg/L
pH	4.2 – 4.7
Impurities	
Total viable count	< 1,000 CFU/g
Enterobacteriaceae	< 10 CFU/g
Coliforms	< 1 CFU/g
<i>Escherichia coli</i>	Absent in 25 g
Yeasts	< 1,000 CFU/g
Moulds	< 1,000 CFU/g
Salmonella	Absent in 25 g
Arsenic	< 0.5 mg/kg
Mercury	< 0.05 mg/kg
Cadmium	< 0.05 mg/kg
Lead	< 0.05 mg/kg
Aflatoxin B1	< 0.1 µg/kg
Aflatoxin B2	< 0.1 µg/kg
Aflatoxin G1	< 0.1 µg/kg
Aflatoxin G2	< 0.1 µg/kg
Fumonisin B1	< 20 µg/kg
Fumonisin B2	< 20 µg/kg
Fumonisin B3	< 20 µg/kg
Sterigmatocystin	< 10 µg/kg
Ochratoxin A	< 2 µg/kg
Deoxynivalenol	< 20 µg/kg
T2-toxin	< 10 µg/kg
HT-2-toxin	< 10 µg/kg
Zearalenone	< 10 µg/kg

The ACAF noted that testing for dioxins and the sum of dioxins and dioxin-like polychlorinated biphenyls (PCBs) had not been provided. The applicant confirmed that biennial testing of relevant enzyme formulation ingredients is performed and provided analysis for three batches of each relevant enzyme formulation ingredients.

ECONASE® XT contains a thermostable xylanase produced by the genetically modified fungal strain *Trichoderma reesei* CBS 114044, a production strain that has been previously evaluated by EFSA (FEEDAP and GMO, 2008; FEEDAP, 2021; GMO, 2009). The ACAF reviewed the Whole

Genome Sequence (WGS) analysis and history of modifications provided for the production strain and agreed that the strain had been fully characterised. Absence of viable cells and recombinant DNA from the production organism was confirmed. In addition, the applicant provided analysis of multiple batches to demonstrate absence of mycotoxins (including trichodermin) and absence of antimicrobial activity.

The liquid forms of the additive were shown to be stable for 24 months at temperatures up to 25 °C. The solid forms were stable for 24 months at 20 to 23 °C, and stable for pelleting up to 95 °C with a retention time of 32 to 33 seconds.

The solid forms of the additive were stable in a premixture for 6 months. Only two forms of the additive (ECONASE® XT 25 L and ECONASE® XT 25) were tested for homogeneity and stability in feedingstuffs. Both forms were capable of homogenous distribution and stable in mash and pelleted feed for 3 months. The ACAF agreed that these conclusions could be extrapolated to all forms of the additive.

The conditions of use of the additive as proposed by the applicant are described in [Table 8](#). The ACAF noted that whilst a minimum content and recommended dose range were specified, the applicant had not proposed a maximum content for any of the animal categories. The ACAF also questioned the rationale for the proposed minimum content of 24,000 BXU/kg feed for laying birds of minor poultry species, considering that the applicant has proposed a recommended dose range of 12,000 – 24,000 BXU/kg feed for laying hens and is proposing extrapolation from laying hens to laying birds of minor poultry species.

Table 8. Proposed conditions of use of ECONASE® XT

Conditions of use proposed by the applicant				
Species or category of animal	Min-max Age	Min. content	Max. content	Withdrawal period
Laying hens	--	12,000 BXU/kg feed	--	--
Minor poultry species other than laying birds	--	8,000 BXU/kg feed	--	--
Laying birds of minor poultry species	--	24,000 BXU/kg feed	--	--
Fattening pigs	--	20,000 BXU/kg feed	--	--
Other provisions and additional requirements for the labelling				
Specific conditions or restrictions for use		For use in compound feed rich in non-starch polysaccharides (mainly arabinoxylans) Store in a cool place (<23 °C) until expiry date (2 years after manufacturing)		
Specific conditions or restrictions for handling		Labelled as a respiratory sensitiser (hazard statement H334)		

Conditions of use proposed by the applicant	
Post market monitoring	Traceability/register of complaints
Specific conditions for use in complementary feedingstuffs	Stable for pelleting up to 95 °C for a retention period of 32-33 seconds Recommended dosages per kg of complete feedingstuffs: • laying hens: 12,000 – 24,000 BXU • minor poultry species other than laying birds: 8,000 – 24,000 BXU • laying birds of minor poultry species: 24,000 BXU • pigs for fattening: 20,000 – 24,000 BXU

2.1.1. Conclusions on Section II

The ACAF concluded that the additive and the production strain were correctly characterised and that the liquid and solid forms of the additive are stable for 24 months at 25 °C and 20-23 °C, respectively. The solid forms are stable for pelleting to 95 °C for 32-33 seconds, and in a premixture for 6 months. The additive is stable in pelleted and mash feed for 3 months and homogeneity in feed was demonstrated. The ACAF queried why a maximum content had not been proposed for any of the animal categories in the conditions of use and disagreed with the proposed minimum content of 24,000 BXU/kg feed for laying birds of minor poultry species. The applicant is proposing extrapolation from laying hens and therefore a recommended dose range of 12,000 – 24,000 BXU/kg feed would be more appropriate. No further concerns were raised for Section II of the dossier.

2.2. Section III: Safety

2.2.1. Safety for the target species

The applicant presented a systematic literature review and two tolerance studies to support the assessment of safety in the target species.

The literature review identified five EFSA opinions relating to endo-1,4-beta-xylanase and its use in various animal categories, all published between 2018 and 2021. The opinions did not all relate to the endo-1,4-beta-xylanase in the current application (for example, different production organisms), but the ACAF agreed with the applicant's conclusion that the additive is safe under the proposed conditions of use for the target species.

The applicant presented one tolerance study in laying hens and one tolerance study in weaned piglets. The tolerance study in laying hens compared a negative control group, a group treated with the minimum recommended dose of 12,000 BXU/kg feed, and an overdose group treated with 200 times the minimum recommended dose (100 times the maximum

recommended dose). A solid form of ECONASE® XT was used as the test substance. A 200-fold overdose had no adverse effect on mortality or weight gain in laying hens, but there was a negative effect on egg mass output and daily feed intake. The ACAF did not consider these to be adverse effects and agreed that the additive is well tolerated in laying hens and safe at the maximum recommended dose of 24,000 BXU/kg feed. This conclusion can be extrapolated to laying birds of minor poultry species at the recommended dose of 24,000 BXU/kg feed. Taking into consideration the results of the tolerance study, alongside the literature review, the ACAF also concluded that the additive is safe in minor poultry species other than laying birds at the maximum recommended dose of 24,000 BXU/kg feed.

No adverse effects were observed in weaned piglets given a 20-fold overdose of an endo-1,4-beta-xylanase preparation. The ACAF concluded that the additive is safe at the upper recommended dose of 24,000 BXU/kg complete feed in weaned piglets, and this conclusion can be extrapolated to pigs for fattening at a dose of 24,000 BXU/kg complete feed.

The ACAF concluded that the additive is well tolerated by the target species, and that the tolerance studies, together with the literature review, demonstrate that the additive is safe for the target species.

2.2.2. Safety for the consumer

The ACAF reviewed three studies to demonstrate safety for the consumer that have all previously been evaluated by EFSA (FEEDAP, 2008; EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed), 2019):

- Genotoxicity - Bacterial reverse mutation test (OECD Guideline 471)
- Genotoxicity - *In vitro* mammalian chromosomal aberration test (OECD Guideline 473)
- Subchronic oral toxicity - Repeated dose 90-day oral toxicity study in rodents (OECD Guideline 408)

All toxicological studies were conducted using a preparation of ECONASE® XT. The non-enzyme ingredients used in the five formulations of the additive were thought to be innocuous at the levels used.

No evidence of mutagenicity was observed in the bacterial reverse mutation test, and no evidence of clastogenicity was seen in Chinese hamster ovarian cells *in vitro*. Current EFSA guidance requires an *in vitro* mammalian cell micronucleus test, which the applicant had not provided. However, as the data provided was in line with guidance requirements at the time the studies were performed and the other studies showed no

evidence of genotoxicity, the ACAF confirmed that additional information would not be required from the applicant. The ACAF concluded that the additive is non-genotoxic.

The thirteen-week subchronic toxicity study in rats observed no signs of toxicity at the maximum dose of 1,000 mg/kg bw/day. The applicant proposed a no observed adverse effect level (NOAEL) of 1,000 mg/kg bw/day, which the ACAF accepted.

The ACAF agreed that there were no concerns over the safety of the non-enzyme ingredients. The ACAF therefore concluded that all five formulations of ECONASE® XT could be considered safe for consumers.

2.2.3. Safety for the user

The applicant presented the following tests to evaluate the safety of the additive for the user/worker:

- Acute dermal irritation/corrosion study, based on OECD Guideline 404
- Acute eye irritation/corrosion study, based on OECD Guideline 405
- Skin sensitisation – local lymph node assay, based on OECD Guideline 429

The concentrated liquid form of the additive (ECONASE® XT L) was used as the test substance in all three studies. The skin irritation/corrosion study also tested the concentrated solid form of the additive (ECONASE® XT P), which was found to be non-irritating to skin. ECONASE® XT L was found to be non-irritating to eyes and essentially non-irritating to skin.

The ACAF concluded that all five forms of the additive were non-irritating to eyes and skin, and not skin sensitisers.

All three solid forms of the additive (ECONASE® XT P) contained particles in the smaller particle size distribution fraction. However, due to the very low dusting potential of all three forms, the exposure would be low. The ACAF noted that the active ingredients (enzymes) of the additive are regarded as potential respiratory sensitisers due to their proteinaceous nature, and any level of inhalation of the additive by users would constitute a respiratory sensitisation hazard. Therefore, respiratory protection is recommended for all solid forms of the additive.

2.2.4. Safety for the environment

The ACAF were satisfied that recombinant DNA and viable cells of the production strain were not detected in the final product. As the active substance is an enzyme, no further studies were required and the ACAF concluded that the additive poses no risk to the environment.

2.2.5. Conclusions on safety

The ACAF concluded that the additive is safe for the target species at the proposed level of inclusion in feed and is safe for the environment. The additive is non-genotoxic and no adverse effects were observed in a subchronic toxicity study in rats. The additive is therefore considered safe for consumers. The ACAF concluded that all five forms of the additive could be considered non-irritating to skin and eyes and are not skin sensitisers. All forms of the additive contain potential respiratory sensitisers (enzymes), and respiratory protection is recommended for users/workers handling solid forms of the additive.

2.3. Section IV: Efficacy

The applicant presented two short-term and six long-term efficacy studies in laying hens, in addition to two short-term and three long-term efficacy studies in pigs for fattening. An overview of the long-term efficacy trials is shown in [Table 9](#).

Table 9. Overview of long-term efficacy studies for endo-1,4-beta-xylanase

Laying hens			
Study	Replicates/treatment	BXU/kg feed	Duration (days)
1	10 (18 hens per replicate)	0; 12,000; 24,000	196
2	12 (6 hens per replicate) 2 x 2 Metabolisable Energy trial	0/0; 6,000/6,000	168
3	18 (3 hens per replicate)	0; 6,000; 12,000; 24,000	182
4	10 (8 hens per replicate)	0; 12,000	196
5	10 (4 hens per replicate)	0; 12,000	168
6	14 (10 hens per replicate)	0; 12,000	196
Pigs for fattening			
Study	Replicates/treatment	Intended BXU/kg feed	Duration (days)
1	32	0; 8,000; 16,000; 24,000	186
2	12	0; 16,000	105
3	20 (21 pigs per replicate)	0; 16,000	≥126

The ACAF concluded that the additive was efficacious in laying hens at the minimum proposed dose of 12,000 BXU/kg feed. The applicant had proposed a minimum dose of 24,000 BXU/kg feed for minor poultry species for laying, but as the data can be extrapolated from laying hens the

ACAF concluded that the additive is efficacious in minor poultry species for laying at a dose of 12,000 BXU/kg feed. Efficacy in chickens for fattening at a dose of 8,000 BXU/kg feed has been demonstrated previously (FEEDAP, 2008) and so the ACAF concluded that this can be extrapolated to minor poultry species other than laying birds at the minimum dose of 8,000 BXU/kg feed.

The ACAF concluded that the additive is efficacious in pigs for fattening at the proposed minimum dose of 20,000 BXU/kg feed.

2.3.1. Conclusions on efficacy

The ACAF concluded that the additive is efficacious for use in laying hens, minor poultry species other than laying birds, laying birds of minor poultry species and pigs for fattening. This demonstrates that endo-1,4-beta-xylanase favourably affects animal production, performance or welfare, particularly by affecting the digestibility of feedingstuffs.

3. Analytical methods evaluation

Conclusions on the analytical methods are presented here as an extract from the Evaluation Report of the European Union Reference Laboratory for Feed Additives on the Method(s) of the Analysis for endo-1,4-beta-xylanase (EURL, 2019):

"For the quantification of the activity of endo-1,4-beta-xylanase in the feed additive and premixtures the Applicant submitted a single-laboratory validated and further verified spectrophotometric method, based on the formation of reducing sugars reacting with 3,5-dinitrosalicylic acid (DNS) at pH 5.3 and 50 °C while for the feedingstuffs the Applicant submitted a different single-laboratory validated and further verified spectrophotometric method based on the quantification of water soluble dye fragments produced at pH 5.0 and 50 °C by the action of endo-1,4-β-xylanase on commercially available azurine cross-linked wheat arabinoxylan substrates from Megazyme. For the feed additive and premixtures external calibration is performed using a commercially available xylose standard, while for feedingstuffs external calibration is carried out using a xylanase standard with known enzyme activity and subjected to the same experimental conditions than the feedingstuffs samples. For all matrices the measurements are performed by spectrophotometry at 540 nm.

According to the results provided by the Applicant in the frame of the respective validation and verification studies, relative standard deviations for repeatability (RSD_r) and for intermediate precision (RSD_{ip}) ranging from 2.1 to 8.9 % and from 4.1 to 7.2 %, respectively, were obtained for the quantification of the activity of endo-1,4-beta-xylanase in the feed additive, premixtures and feedingstuffs.

Based on the performance characteristics available the EURL recommends for official control these methods for the quantification of the total endo-1,4-beta-xylanase activity in these three matrices.

Further testing or validation of the methods to be performed through the consortium of National Reference Laboratories as specified by Article 10 (Commission Regulation (EC) No 378/2005, as last amended by Regulation (EU) 2015/1761) is not considered necessary."

The FSA/FSS accepts the EURL analytical method evaluation reports. The FSA/FSS determined the analytical methods proposed as appropriate for official controls for this feed additive. The analytical methods were approved in 2019, at the time in which the UK was still an EU member.

4. Conclusions

The ACAF concluded that all five forms of the additive and the production strain were correctly characterised. The liquid and solid forms of the additive are stable for 24 months at 25 °C and 20-23 °C, respectively. The solid forms are stable for pelleting to 95 °C for 32-33 seconds and in a premixture for 6 months. All forms of the additive are stable in pelleted and mash feed for 3 months, and the additive is capable of homogenous distribution in feed.

The ACAF concluded that the additive is safe for the target species at the proposed level of inclusion in feed. ECONASE® XT is non-genotoxic and no treatment-related adverse effects were observed in a subchronic toxicity study in rats, which tested dose levels up to 1,000 mg/kg bw/day of a preparation of ECONASE® XT. There were no concerns over the safety of other ingredients, so all five forms of the additive are considered safe for consumers.

The ACAF concluded that all five forms of the additive could be considered non-irritating to skin and eyes and are not skin sensitisers. All five forms of the additive are potential respiratory sensitisers. Respiratory protection is recommended for users handling solid forms of the additive. The additive is considered safe for the environment.

The ACAF concluded that the additive is efficacious for use in laying hens, minor poultry species other than laying birds, laying birds of minor poultry species and pigs for fattening. This demonstrates that ECONASE® XT favourably affects animal production, performance or welfare, particularly by affecting the digestibility of feedingstuffs.

The FSA/FSS agree with the conclusions reached by the ACAF. The FSA/FSS accepts the EURL analytical method evaluation reports and determined the analytical method as appropriate for official controls for this feed additive.

Abbreviations

Abbreviation	Definition
ACAF	Advisory Committee on Animal Feedingstuffs
BW	Body weight
BXU	Unit of xylanase activity
CFU	Colony forming unit
DNA	Deoxyribonucleic acid
EC	European Commission
EFSA	European Food Safety Authority
EU	European Union
FSA	Food Standards Agency
GB	Great Britain
GLP	Good Laboratory Practice
FEEDAP	Panel on Additives and Products or Substances used in Animal Feed
NOAEL	No observed adverse effect level
OECD	Organisation for Economic Co-operation and Development
PCBs	Polychlorinated biphenyls
RSD _{ip}	Relative standard deviation for intermediate precision
RSD _r	Relative standard deviation for repeatability
WHO	World Health Organisation

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Professor Emily Burton, Dr. Michael Salter and Dr. Adam Smith declared indirect conflicts of interest and remained in the meetings for discussion.

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References

- EC (European Commission). (2003). *Regulation No 1831/2003 of the European Parliament and of the Council on additives for use in animal nutrition*. <https://www.legislation.gov.uk/eur/2003/1831/contents>
- EFSA FEEDAP Panel and GMO Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) and Panel on Genetically Modified Organisms (GMO)). (2008). *Safety and efficacy of Econase XT P/L as feed additive for chickens for fattening, chickens reared for laying, turkeys for fattening, turkeys reared for breeding and piglets (weaned)*. <https://www.efsa.europa.eu/en/efsajournal/pub/712>
- EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed). (2019). *Assessment of the application for renewal of authorisation of ECONASE® XT (endo-1,4- β -xylanase) as a feed additive for piglets (weaned), chickens for fattening, chickens reared for laying, turkeys for fattening and turkeys reared for breeding*. <https://www.efsa.europa.eu/en/efsajournal/pub/5880>
- EFSA FEEDAP Panel (EFSA Panel on Additives and Products or Substances used in Animal Feed). (2021). *Assessment of the feed additive consisting of endo-1,4- β -xylanase produced by *Trichoderma reesei* CBS 114044 (ECONASE® XT) for piglets (weaned), chickens reared for laying, chickens for fattening, turkeys for fattening and turkeys reared for breeding for the renewal of its authorisation (Roal Oy)*. <https://www.efsa.europa.eu/en/efsajournal/pub/6458>
- EFSA GMO Panel (EFSA Panel on Genetically Modified Organisms). (2009). *Scientific Opinion of the Panel on Genetically Modified Organisms on a request from the European Commission related to the enzyme preparation of trade name 'Econase XT P/L (endo-1,4 β -xylanase) as a feed additive for chickens and turkeys for fattening, chickens reared for laying, turkeys reared for breeding and piglets (weaned)*. <https://doi.org/10.2903/j.efsa.2009.1058>
- EURL-FA (European Reference Laboratory for Feed Additives). (2019). *Evaluation Report on the Analytical Methods submitted in connection with the Application for Authorisation of a Feed Additive according to Regulation (EC) No 1831/2003. Endo-1,4-beta-xylanase*. https://joint-research-centre.ec.europa.eu/reports-and-technical-documentation/fad-2018-0071_en

Supplementary Materials

Download: <https://science.food.gov.uk/article/129287-safety-assessment-on-the-safety-and-efficacy-of-an-endo-1-4-beta-xylanase-econase-xt-as-a-feed-additive-for-use-in-laying-hens-minor-poultry-speci/attachment/264492.png>
