

New enzyme technology boosts performance of wheat and corn-based diets

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Challenge: deliver innovative and sustainable

solutions Reference: Least cost formulation from Rafael Duran, November 2010. October prices

Grower broiler: 270.56 €/t. Nutritional requirements based on Schothorst

Nutrient	Energy (AME)	Protein	Av Lys	Av Met	Av P
Content	12.34 MJ/kg 2950 Kcal/kg	21%	1.05 %	0.8	0.38 %
Cost of the unit in €	28.80 (1 MJ) 1.21 (10 Kcal)	4.792	12.07	30.36	24.60

Grower pig: 227.23 €/t. Nutritional requirements based on FEDNA, 2006

Nutrient	Energy (NE)	Protein	Dig Lys	Dig Meth+Cys	Dig P
Content	9.54 MJ/kg 2280 Kcal/kg	15 %	0.72 %	0.43	0.23%
Cost of the unit in €	17.81 (1 MJ) 0.75 (10 Kcal)	No cost	18.30	No cost	22.09

Composition of plant materials – K.E.B. Knudsen

Raw material g/kg dry matter	Corn	Wheat	Barley hulled	Soya meal	Rapeseed meal	Sunflower meal	Wheat bran
Starch	690	651	587	27	18	10	222
B-Glucan	1	8	42	-	-	-	24
S-NCP	9	25	56	63	55	57	29
Arabinose	3	7	6	9	12	8	7
Xylose	2	9	6	2	4	4	10
Glucose	1	4	39	6	9	5	8
I-NCP	66	74	88	92	123	136	273
Cellulose	22	20	43	62	52	123	72
Total NSP	97	119	186	217	220	315	374
Lignin	11	19	35	16	134	133	75
Dietary fibre	108	138	221	233	354	602	449

S-NCP: soluble non cellulosic polysaccharides

S-ICP: insoluble non cellulosic polysaccharides

Carbohydrate and lignin contents of plant materials used in animal feeding

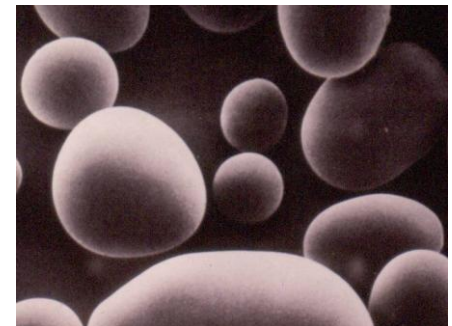
Animal Feed Science Technology 67 (1997) 319 - 338

Wheat and corn are highly variable

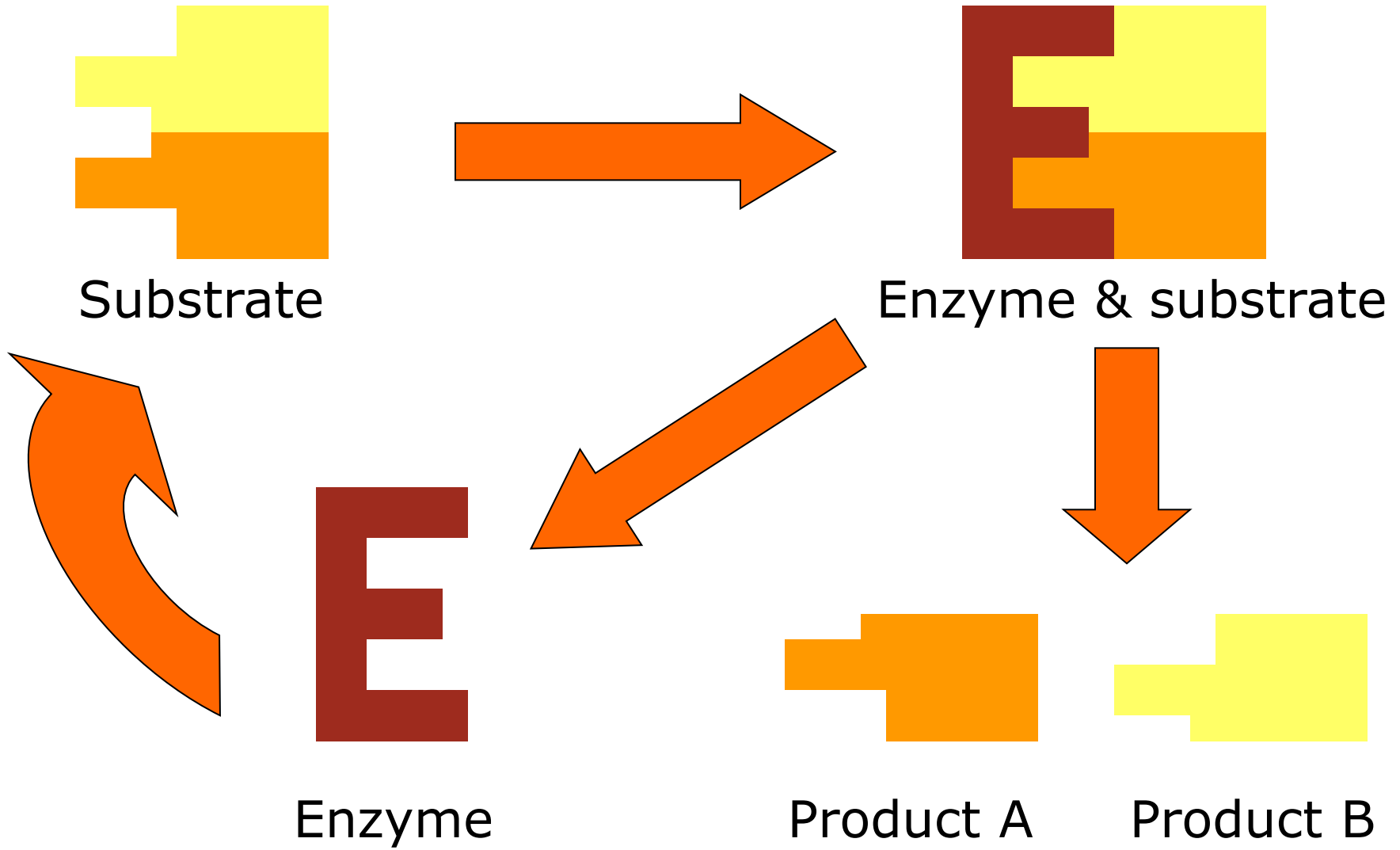
Harvest year	Wheat		Corn	
	Viscosity, cPs	CV%	% in vitro starch digestibility	CV%
2009	7.92	35.4	40.5	13.8
2008	8.55	29.2	36.4	27.2

Number of grain samples analysed globally by Danisco from harvest year: 268 wheat and 547 corn in 2009, 370 wheat and 473 corn in 2008 – Source Avicheck database

CV% = standard deviation/mean * 100



How do enzymes work?

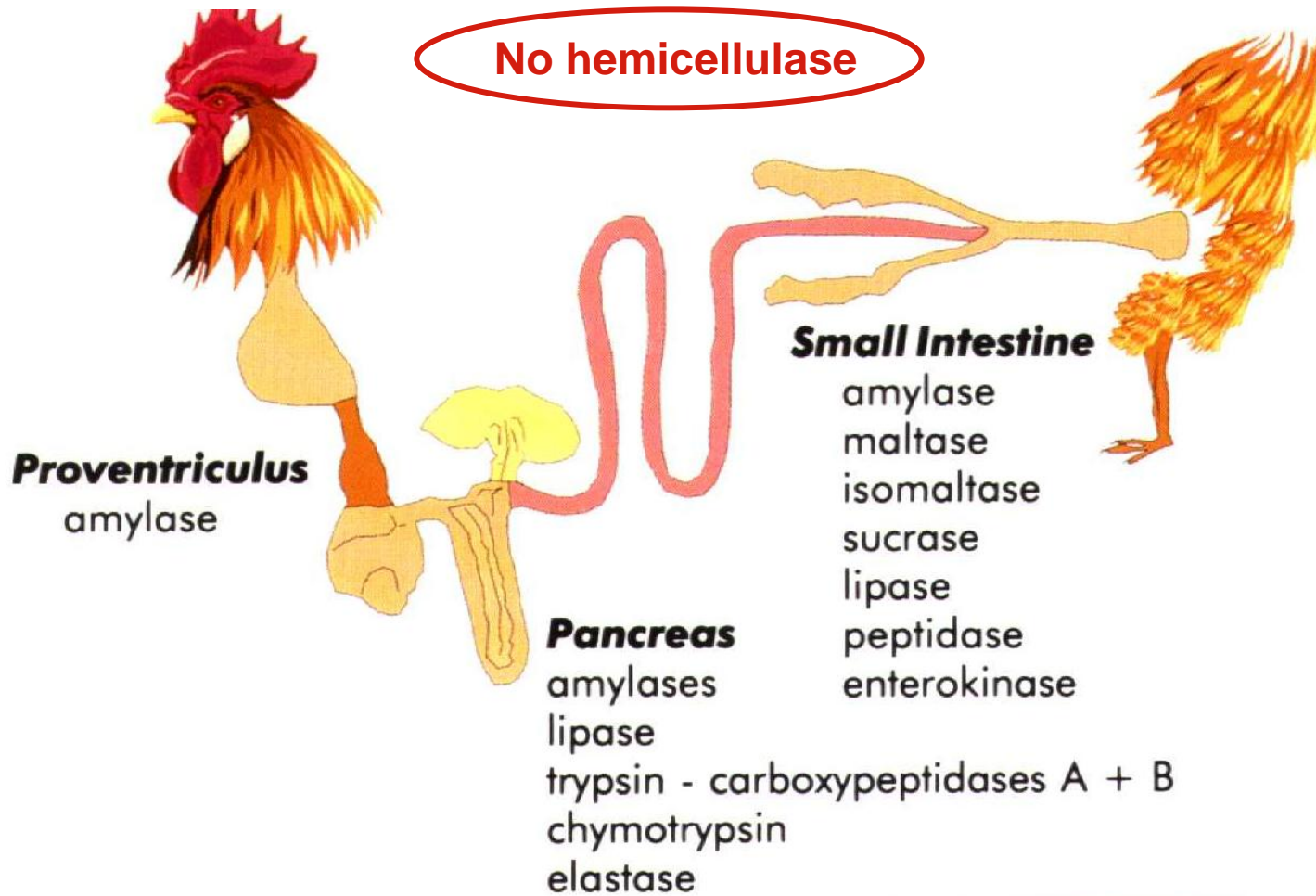


Enzyme

Product A

Product B

Major sites of endogenous enzyme production in poultry



Danisco Xylanase – innovative solution for wheat-based diets

A preparation of endo-1,4- β -xylanase (E.C. 3.2.1.8) produced by *Trichoderma reesei*, EC Registration number 4a11

Guaranteed minimum activity of 400 U/g in liquid (L) and dry (G) forms

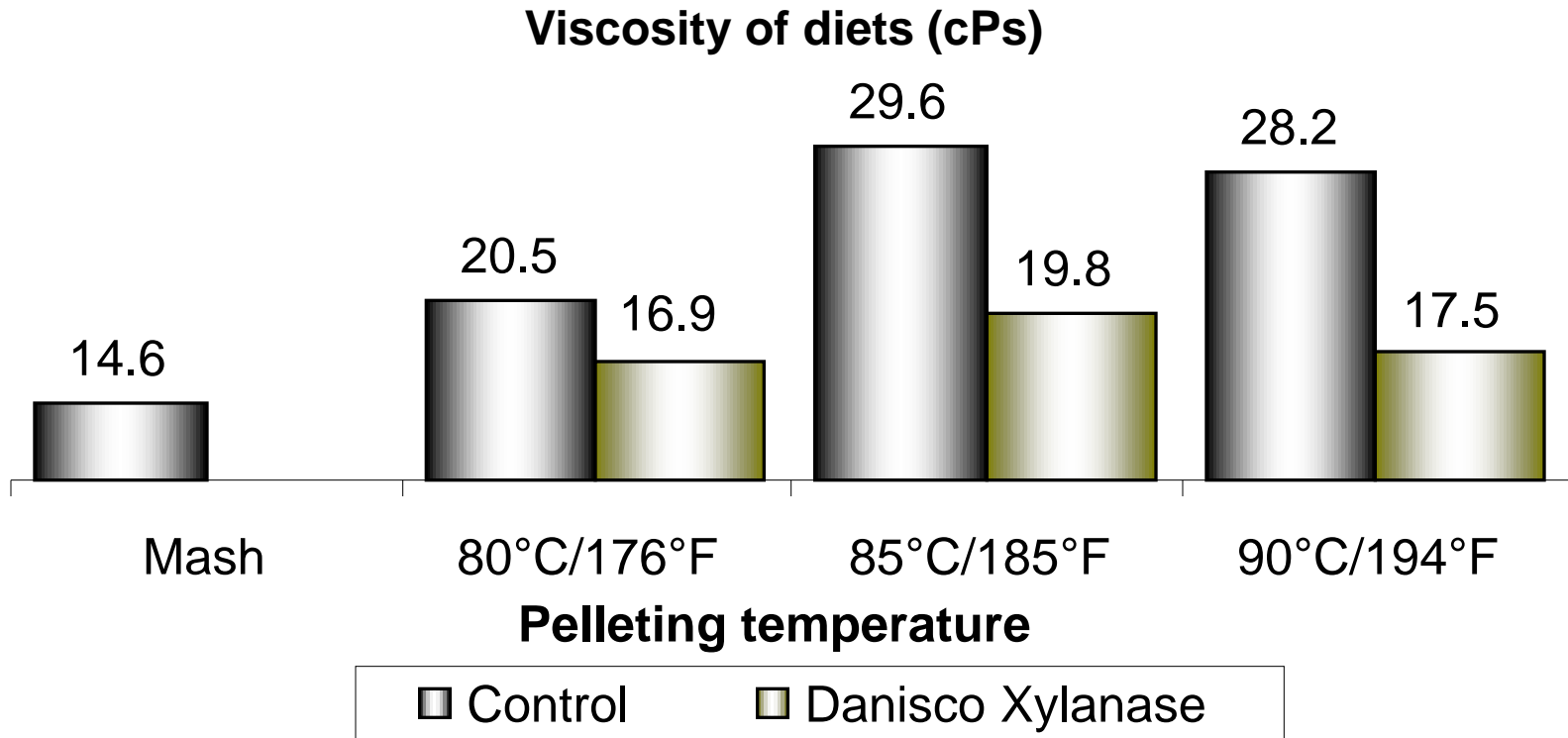
A 2nd generation xylanase product

Heat stable to 90°C



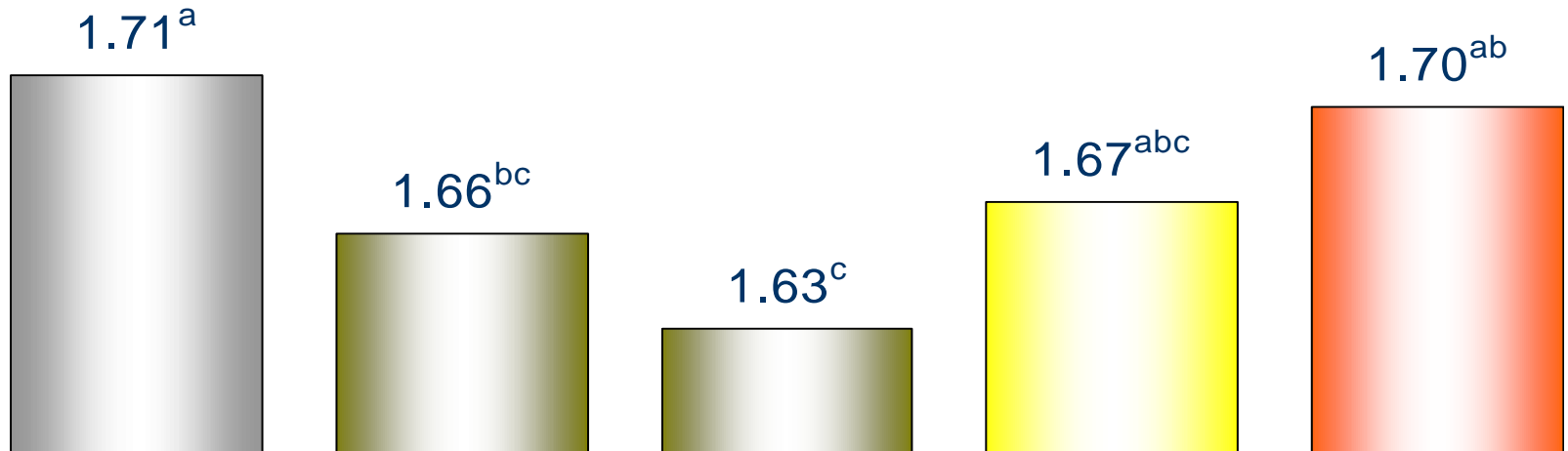
* A premixture with 8,000 U/g (guaranteed minimum) is also available

Thermostability & efficacy of Danisco Xylanase is maintained after pelleting (90° C)



Danisco Xylanase gives superior performance versus two competitors in broilers fed wheat/barley-based diets

FCR from 0-6 weeks

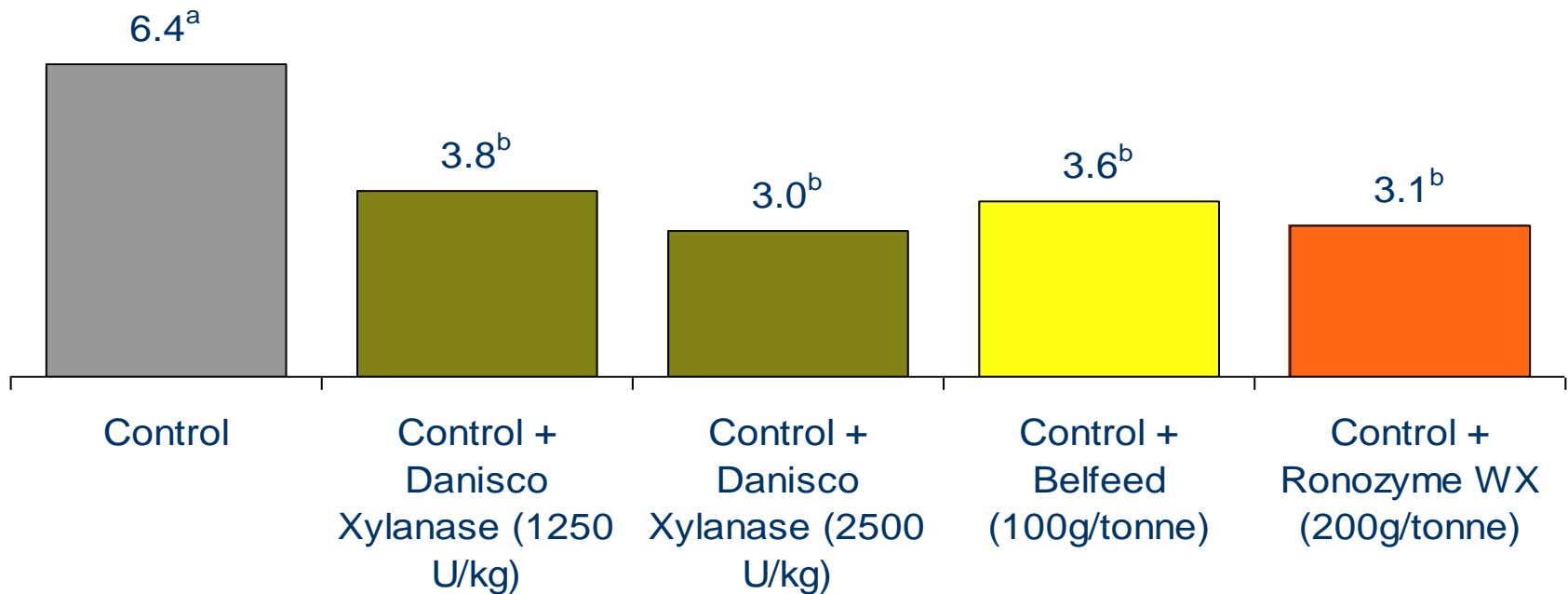


abcP<0.05

Reference:DX.AU.B.09.19
 Gatton College, Queensland University, Australia

Danisco Xylanase gives superior performance versus two competitors in broilers fed wheat/barley-based diets

Gut viscosity at 21 days (cPs)



^{ab}P<0.05

DAN xylanase versus Belfeed

Trial carried out in Denmark in 2010

Ross 308 broilers grown in a commercial broiler house to 35 days of age

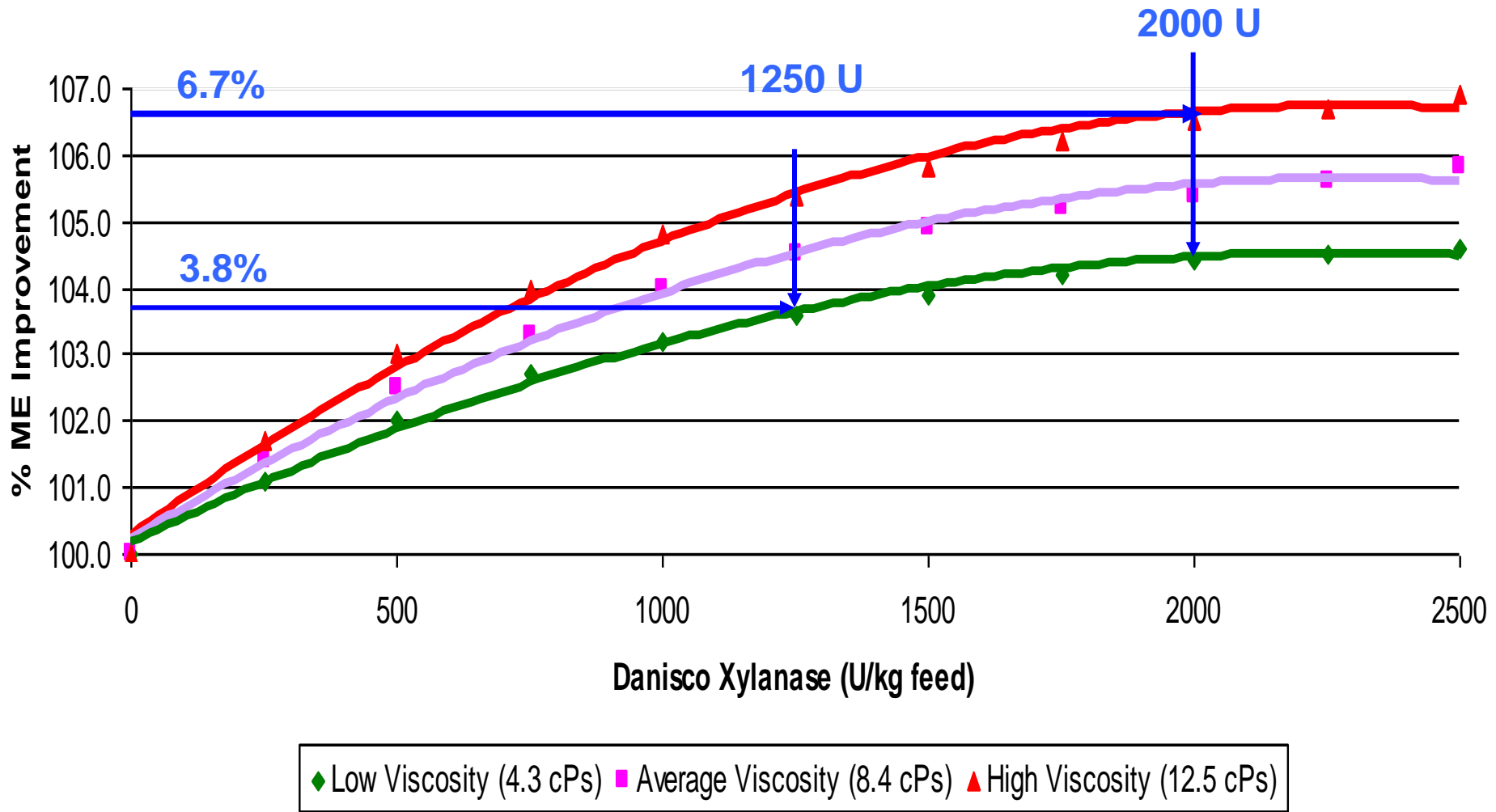
12 replicate pens of 64 broilers/pen or 768 broilers per treatment, 4 treatments: 2 xylanases +/- Enviva EO
 Broilers were fed a wheat/corn/soya-based starter diet from day 1 to day 8 and a wheat/soya-based grower diet + whole wheat from day 9 to day 34, 1 day withdrawal

Results at 34 days of age	Control	Experimental treatment
	Belfeed*	Danisco xylanase**
Weight, g	2116 ^a	2166 ^b + 50g
FCR, g/g	1.608 ^a	1.600 ^a
FCR corrected for mortality	1.580 ^a	1.565 ^b - 1.5 pts
Mortality, %	3.0	3.9
Ileal viscosity, cPs	7.6 ^a	5.6 ^b - 2 pts

a,b P<0.05

* 10 U ** 1600U/kg feed

Avicheck™ estimates % ME improvements to wheat according to Avicheck viscosity values



Using Average Avicheck wheat values* (-/+ 2 SD*) to cover ~95% of the sample population

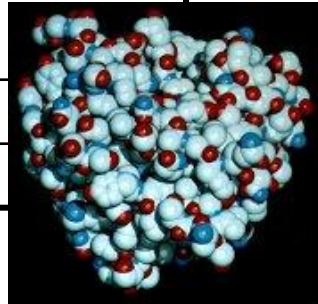
* based on over 900 wheat samples from 11 countries, harvest years 2006-2008

*SD = Standard Deviation

Avizyme 1505 - Innovative solution in corn and soya-based



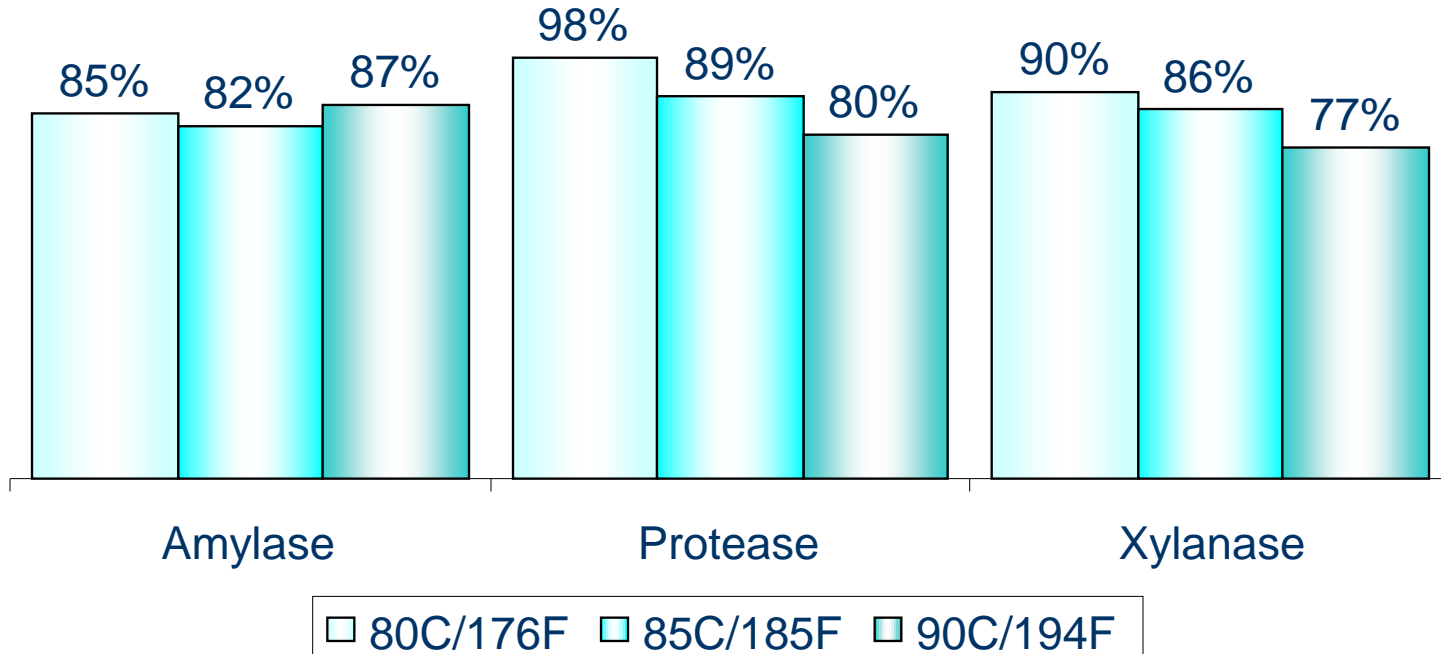
	Avizyme 1505
EU Registration number	4a10
Lapse date	3 December 2019 (currently broilers, turkeys and ducks)
Product composition	Endo-1,4-beta-xylanase: 1500 U/g Alpha-amylase: 2000 U/g Subtilisin (protease): 20000 U/g
Approved minimum dose rates	Chickens for fattening: 0.125 kg/tonne Ducks: 0.05 kg/tonne Turkeys for fattening: 0.20 kg/tonne
Thermo-stability claim	Up to 90°C (194°F)
Stability claims	15 months at 20°C



Az1505 is heatstable to 90° c

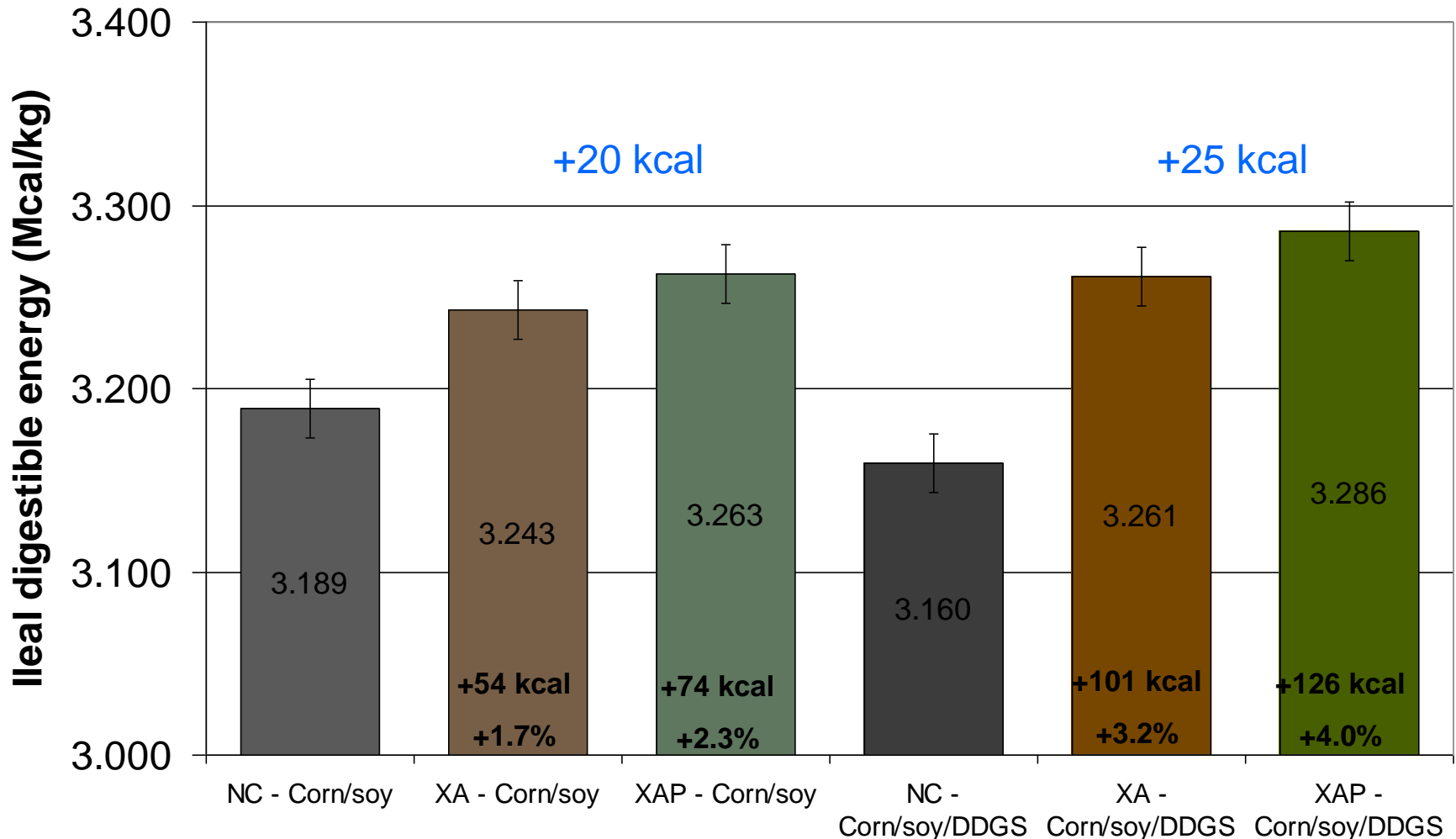
→ Avizyme 1505 contains Danisco Xylanase

Avizyme 1505 is stable to pelleting temperatures up to 90° C

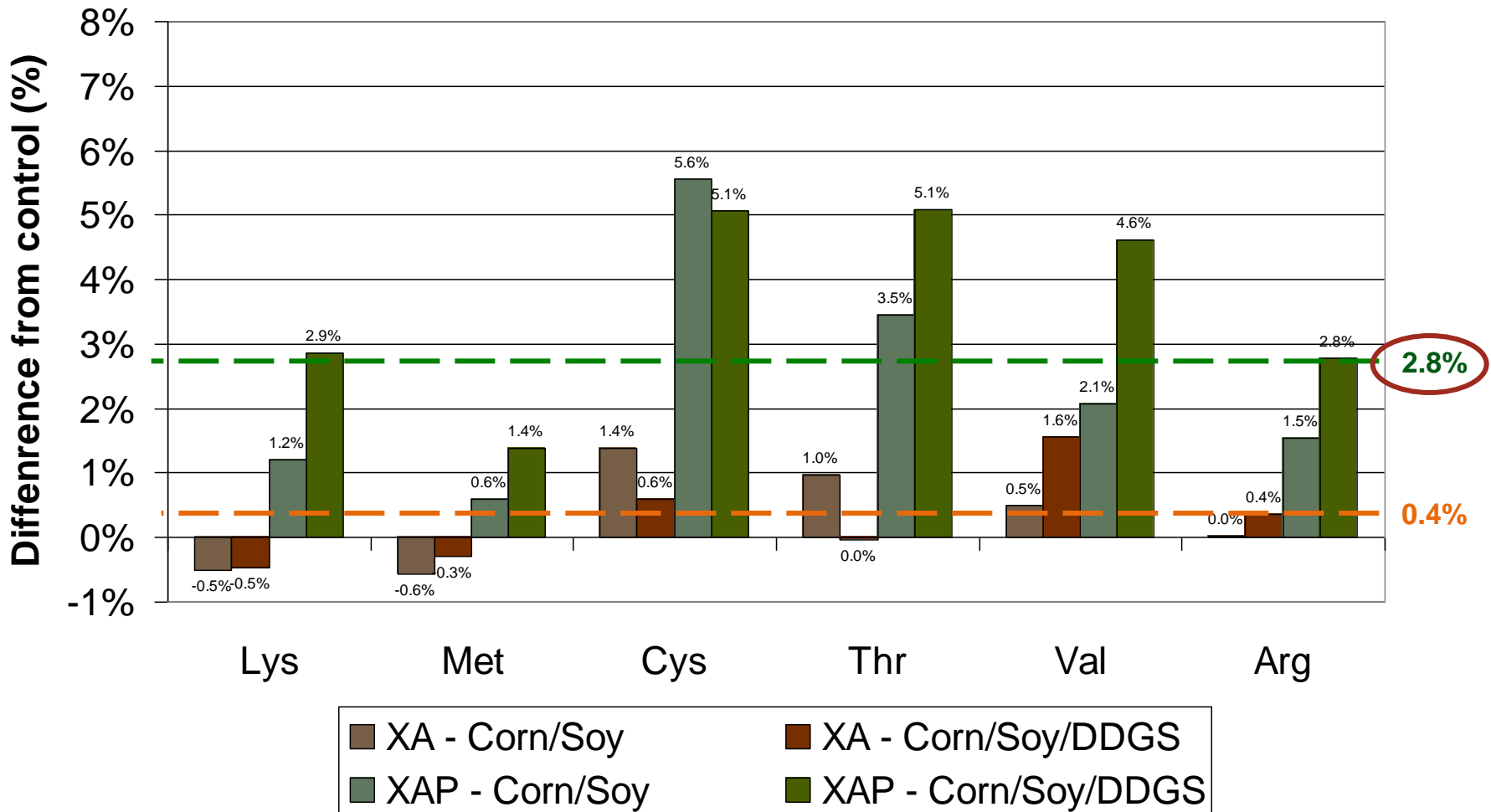


- steam conditioning time 30 seconds
- inlet steam pressure 2 bar (29 psi)
- pellet die size 3mm

Addition of protease on top of XA increased IDE by 20 and 25 kcal/kg compared to XA effect

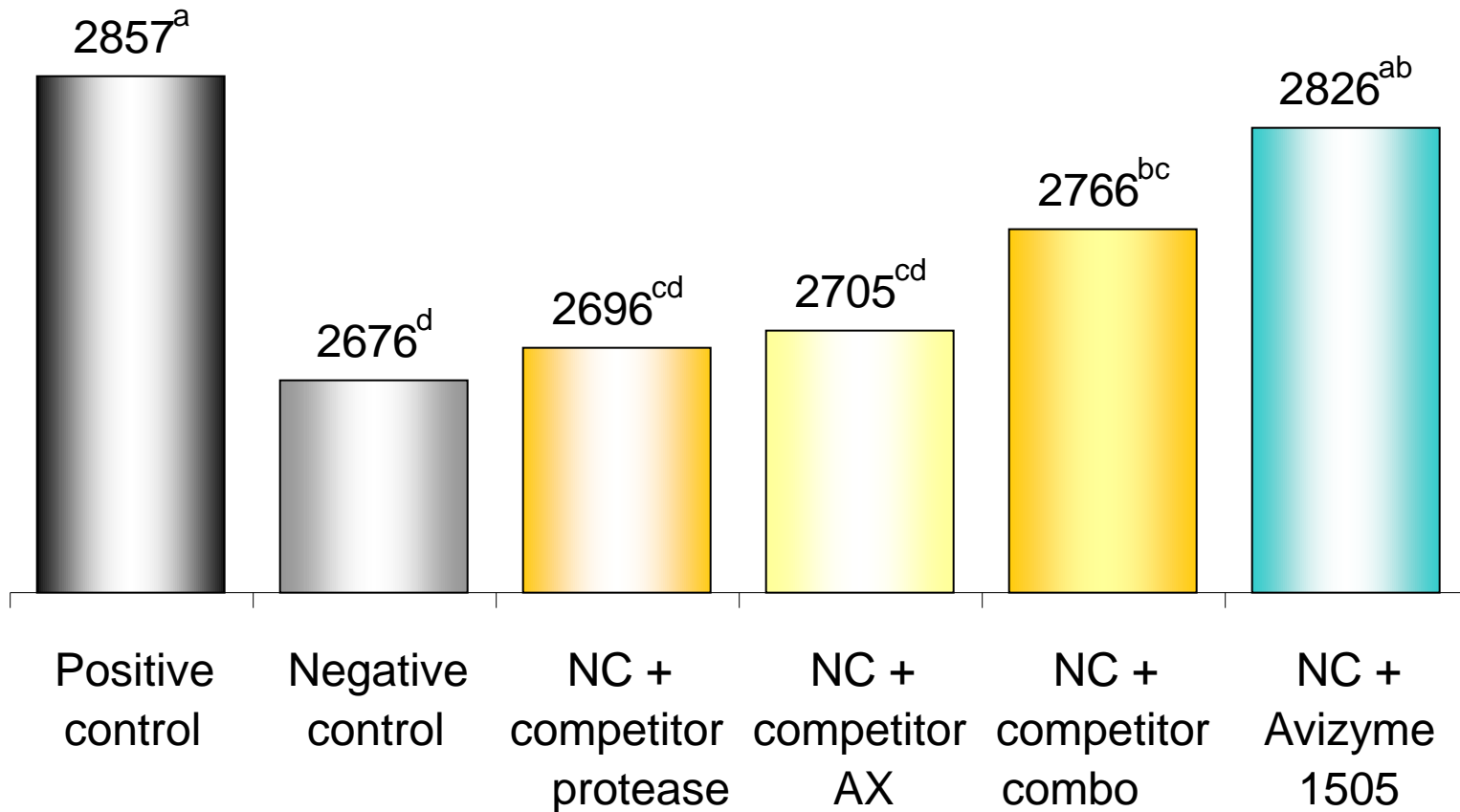


Reponses to protease on top of XA appeared greater in diets with DDGS for some amino acids



Avizyme 1505 outperforms competitor products in broilers fed mixed grain diets

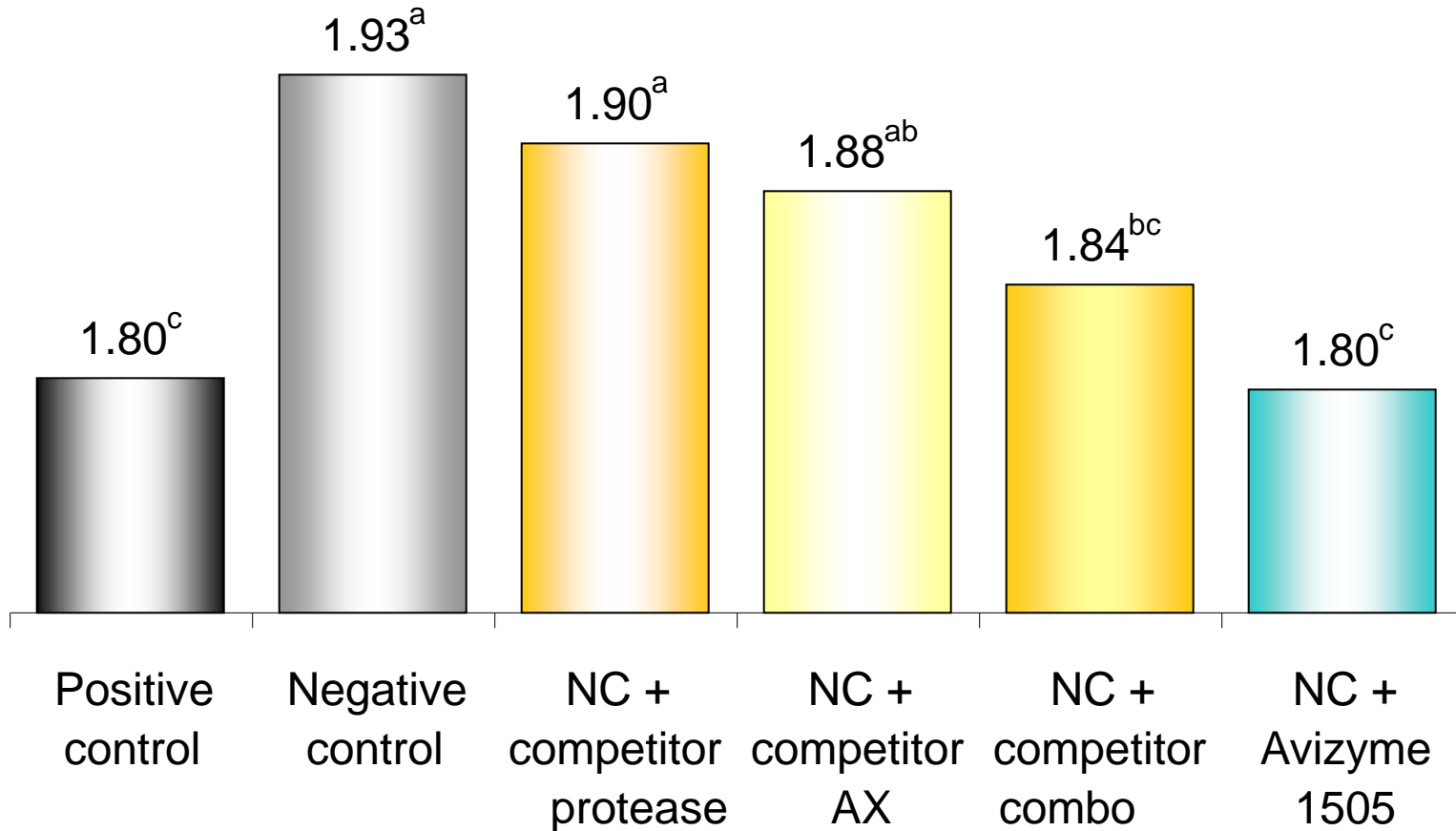
Weight gain (g, 1-42 days)



a,b,c,d P<0.05 NC = Negative Control

Avizyme 1505 outperforms competitor products in broilers fed mixed grain diets

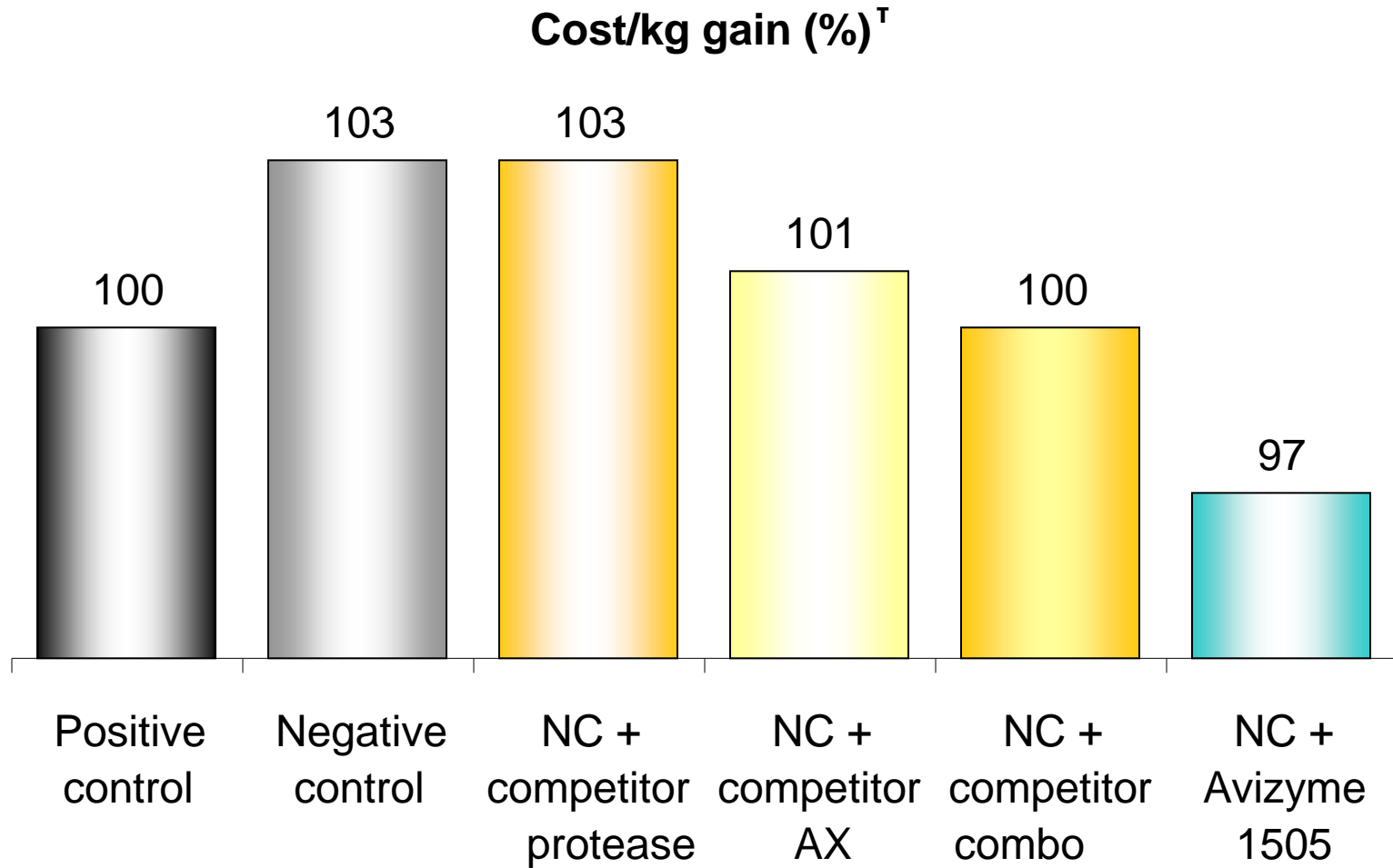
FCR_c* (1-42 days)



a,b,c P<0.05 NC = Negative Control

* FCR corrected 3 points for every 100g difference in bodyweight versus the Positive control

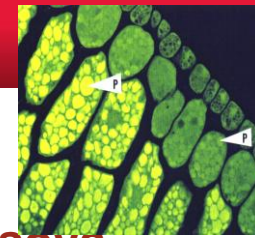
Avizyme 1505 outperforms competitor products in broilers fed mixed grain diets



NC = Negative Control

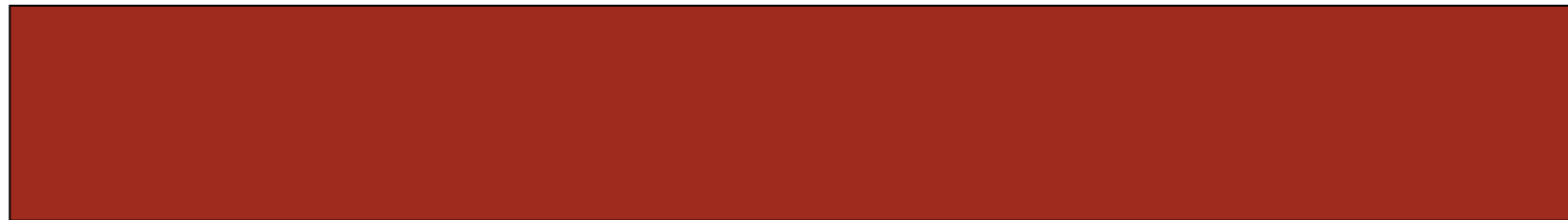
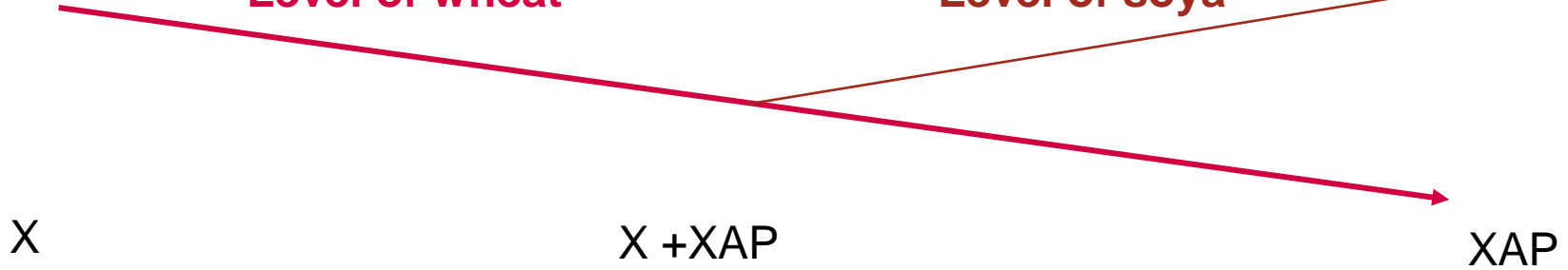
[†] Expressed relative to the Positive control, including product prices

Recommendations for use in poultry



Level of wheat

Level of soya



Wheat only

Corn/wheat

Corn only

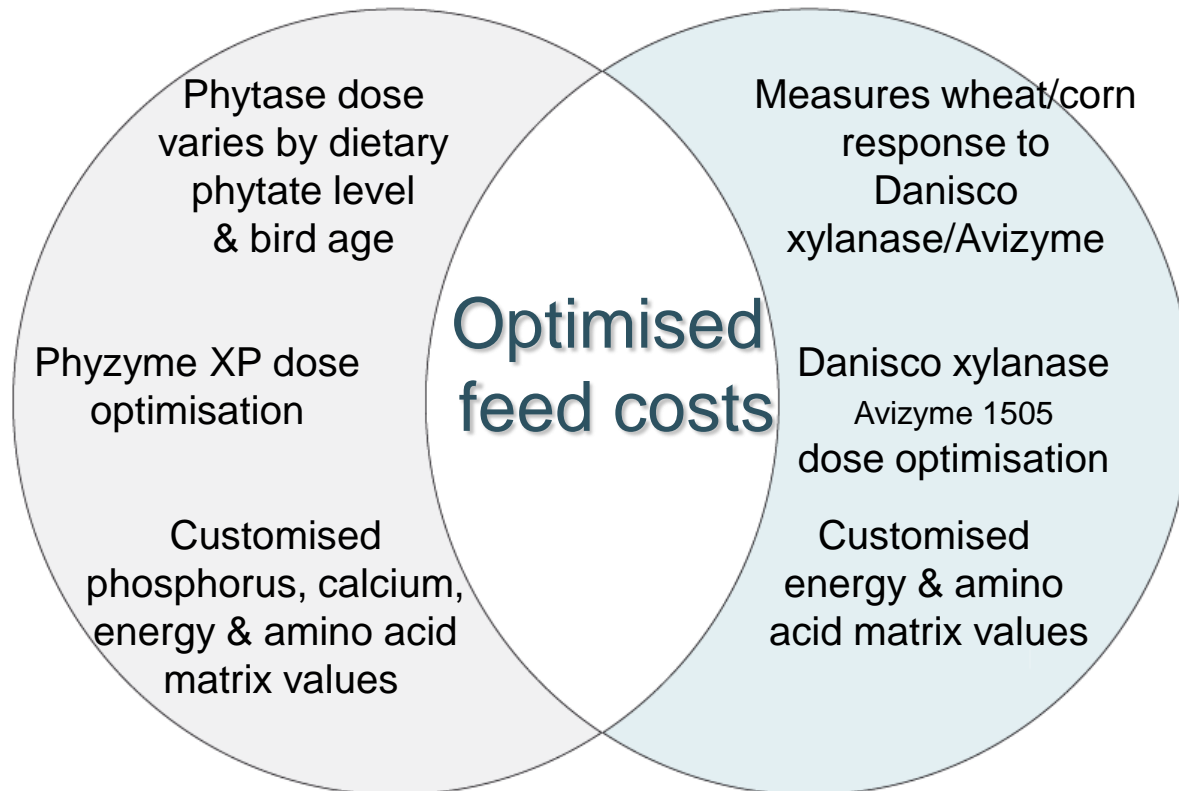


In combination with Phyzyme XP

Danisco xylanase and/or Avizyme® 1505 & Phyzyme® XP product recommendations

Phycheck

Avicheck Wheat/Corn



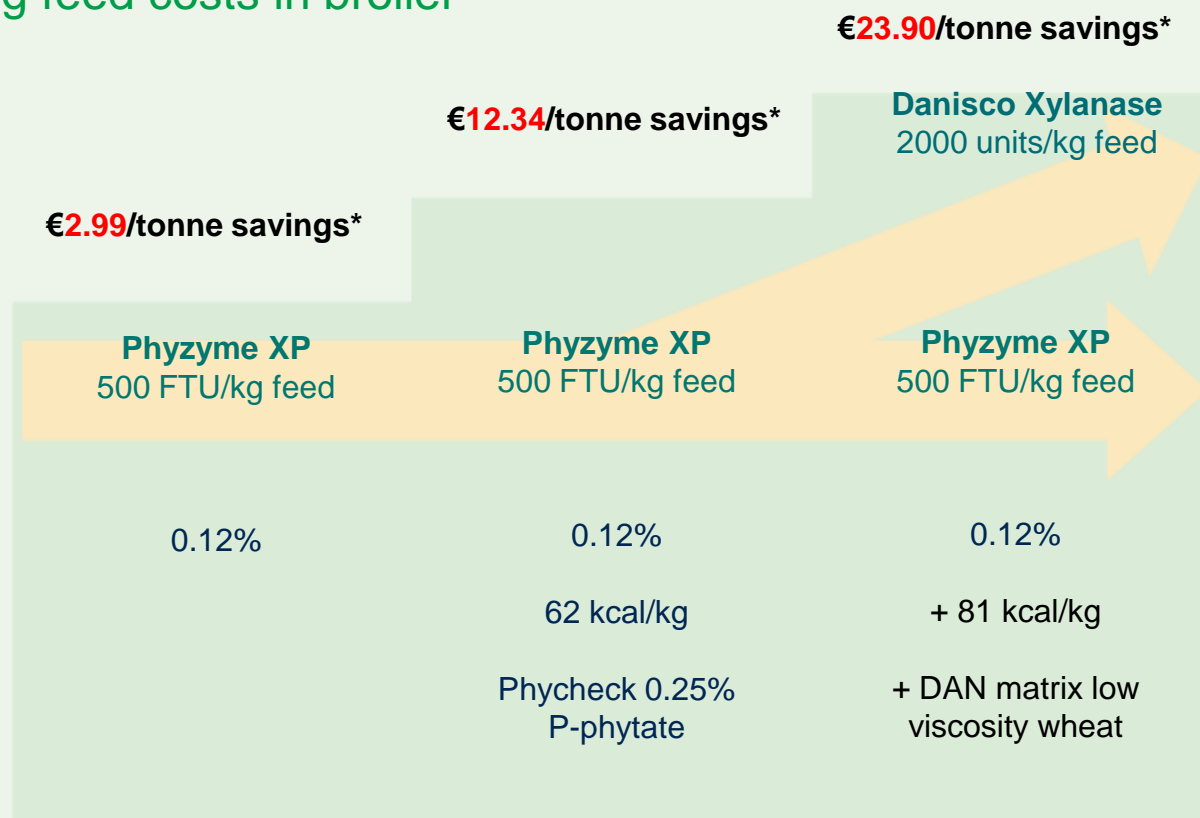
Your benefits

- ✓ **More profit** – specific matrix values to **maximise feed cost savings**
- ✓ **More confidence - more accurate matrix values** optimised according to wheat and/or corn quality and dietary phytate levels

Danisco Xylanase in combination with Phyzyme[®] XP we can help you improve your profits



Your guide to minimising feed costs in broiler



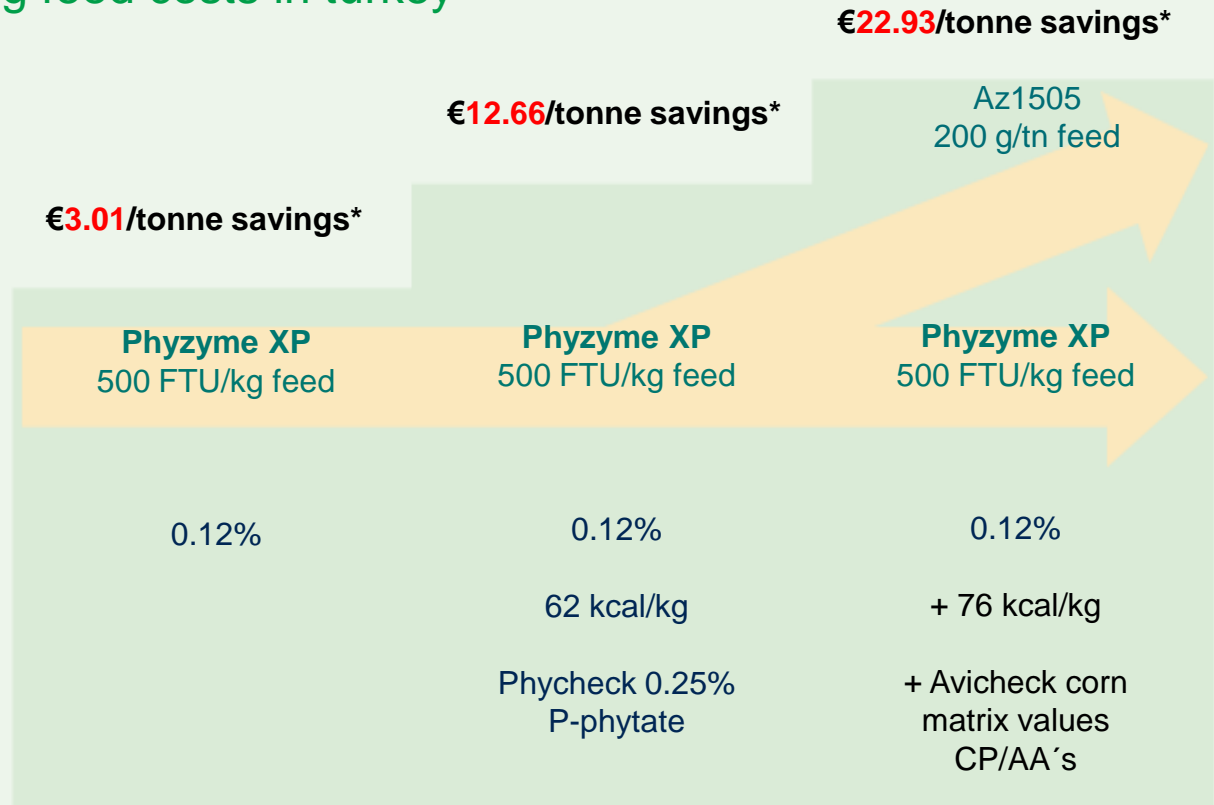
According to formulation adjusted by Rafael Duran – Prices Schothorst, NL, October-November 2010
The cost reductions shown include the cost of the enzymes.

XP

we can help you improve your profits

Guide in a BUT turkey grower 5-8 weeks: 24% CP, 3012 kcal ME, 0.71% avP, 1.31% Ca, 1.51% avLys

Your guide to minimising feed costs in turkey

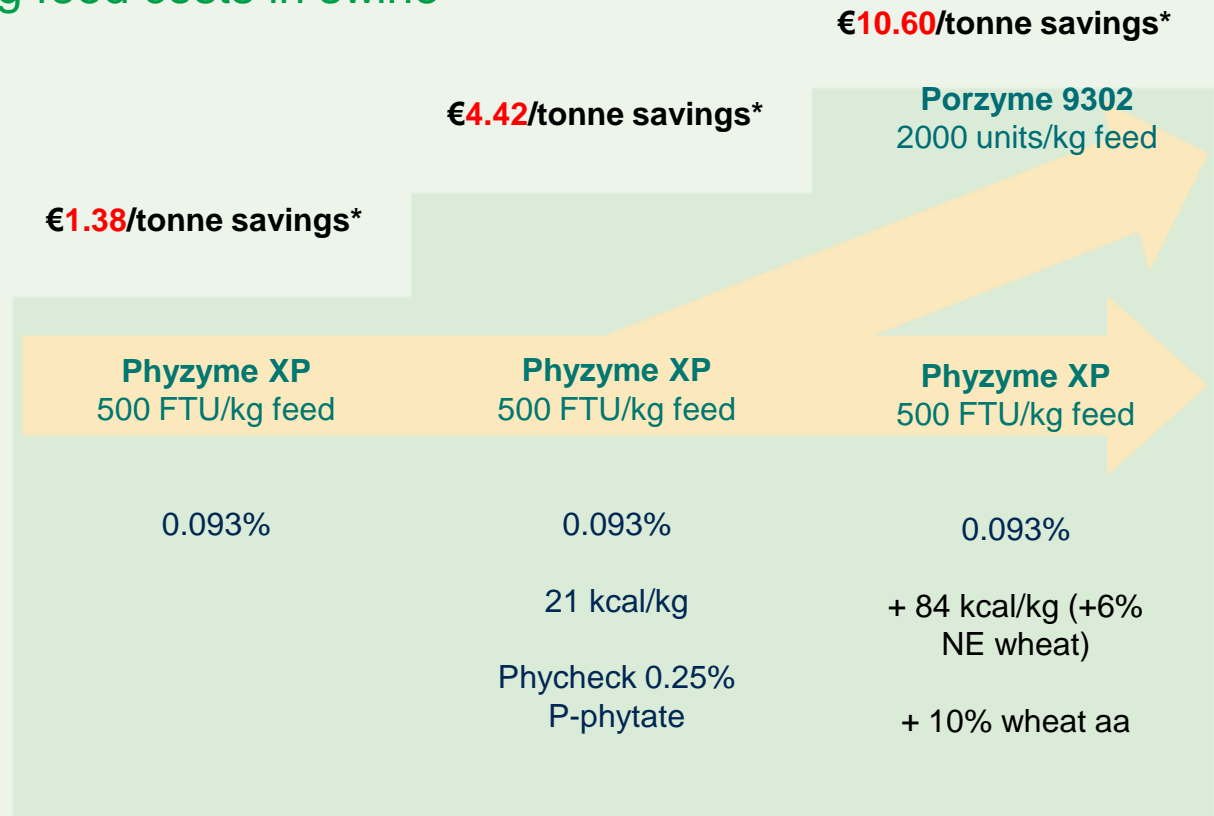


According to formulation adjusted by Rafael Duran – Prices Schothorst, NL, October-November 2010
The cost reductions shown include the cost of the enzymes. This feed is corn-soya based

XP

we can help you improve your profits

Your guide to minimising feed costs in swine



According to formulation adjusted by Rafael Duran – Grower –finisher pig –FEDNA 2006. Prices Oct-Nov 2010
 The cost reductions shown include the cost of the enzymes.

Take home messages

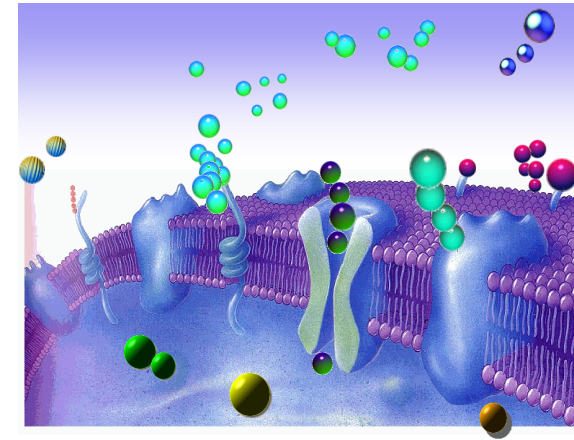
The diet content in available nutrients for the birds vary depending on number of factors

The best combination and dose of enzyme activities will be determined with regard to the substrates, efficacy and objectives

Concerns about feed safety increases the need for heat stable enzymes

Combining the different activities produce the most consistent improvement in the response, compared to either enzyme added individually, and reduce the variation in body weight gain

Using Danisco recommendations can help you save up to....23€ per tonne treated



Thanks for your attention



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