



# DE-ODORASE

Atmospheric Ammonia  
Reduction



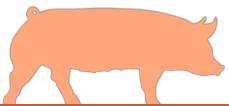


# The effects of ammonia on pigs

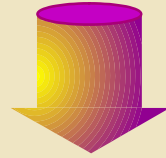
25	ppm	Recommended maximum level
50	ppm	Reduction in performance and health Sneezing, loss of appetite
100	ppm	Shallow and irregular breathing
>400	ppm	followed by convulsion

# What is DE-ODORASE?

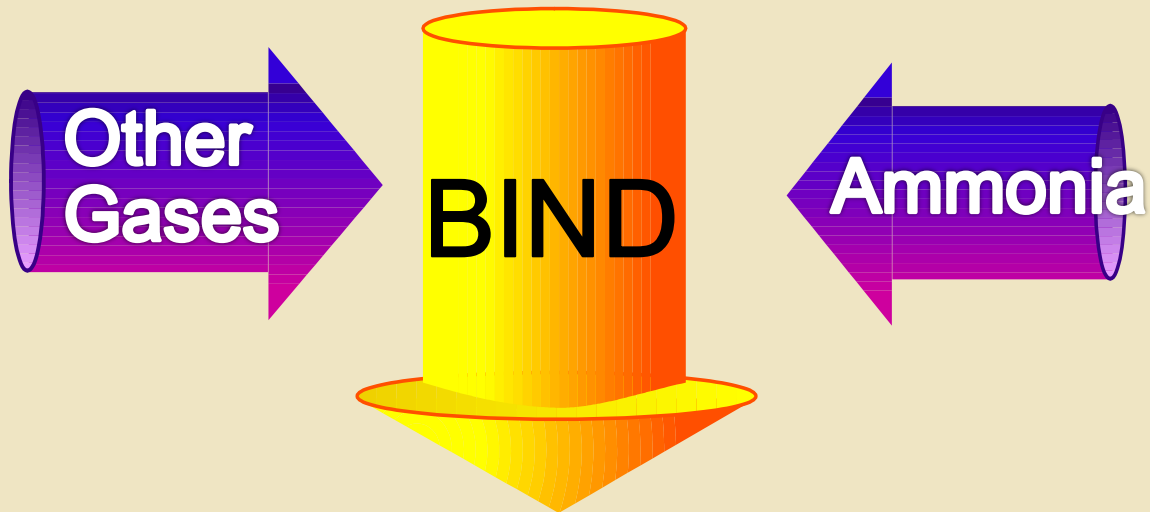
A natural extract of the yucca plant  
that binds ammonia



# Mode of Action



Yucca  
Glycocomponents



*Less Ammonia  
& Improved Microbial Decomposition*

# Applications for DE-ODORASE



- Pig and poultry feeds: NH<sub>3</sub> control
- Finishing pigs: skatole
- Confined ruminants
- Rabbit diets
- Horse Stalls
- Dog and Cat foods
- Direct treatment of anaerobic lagoons
- Aquaculture



# DE-ODORASE for pigs benefits

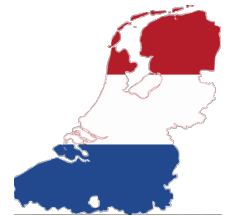
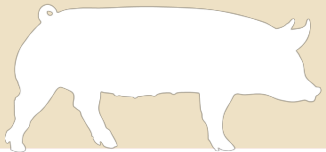
## Increase

- improved performance better rates of gain, and feed efficiency
- health of livestock, less risk respiratory disease
- breeding herd farrowing index, high levels of ammonia associated with delay onset of puberty in gilts
- less boar taint due to binding of Skatole and androsterone
- stockmens' working conditions

## Decrease

- mortality of livestock
- respiratory disease incidence
- offensive odors caused by ammonia and other gases
- volumes of waste manure for final disposal
- smell complaints from non-farming neighbors

# Ammonia in Pig Buildings in the Netherlands



What ammonia concentrations can be expected under Dutch circumstances?

Is DE-ODORASE able to reduce atmospheric ammonia concentrations?

Does DE-ODORASE have any influence on the technical results of the fattening pigs?



*Source: H.G. Schuerink*



In American studies atmospheric ammonia concentrations in ventilated air were about 22 ppm, whereas Dutch standards are below 10 ppm. (Kempe *et.al.*, 1993)

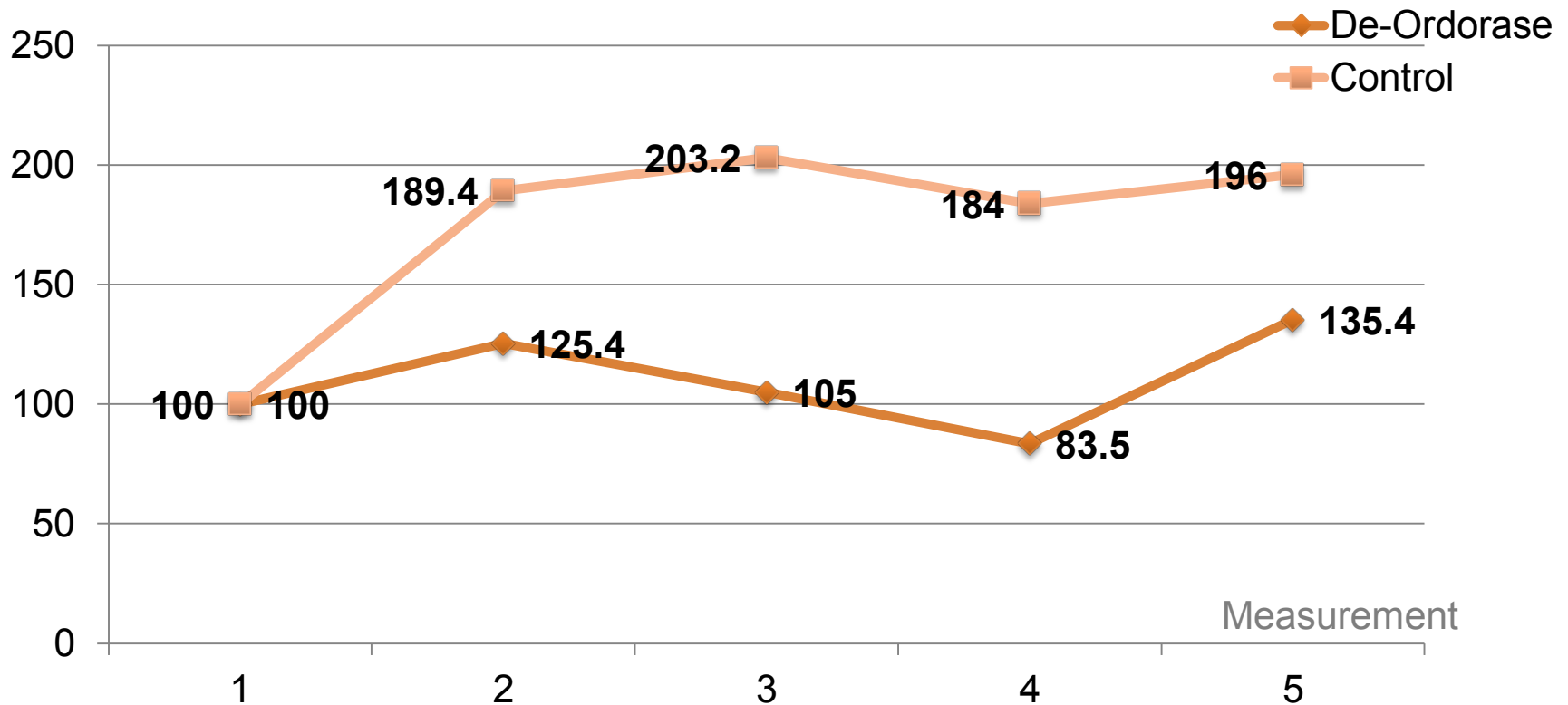
Research Institute for Livestock Feeding and Nutrition,  
Lelystad, the Netherlands



# Effect of DE-ODORASE on Atmospheric Ammonia: Farm All farms

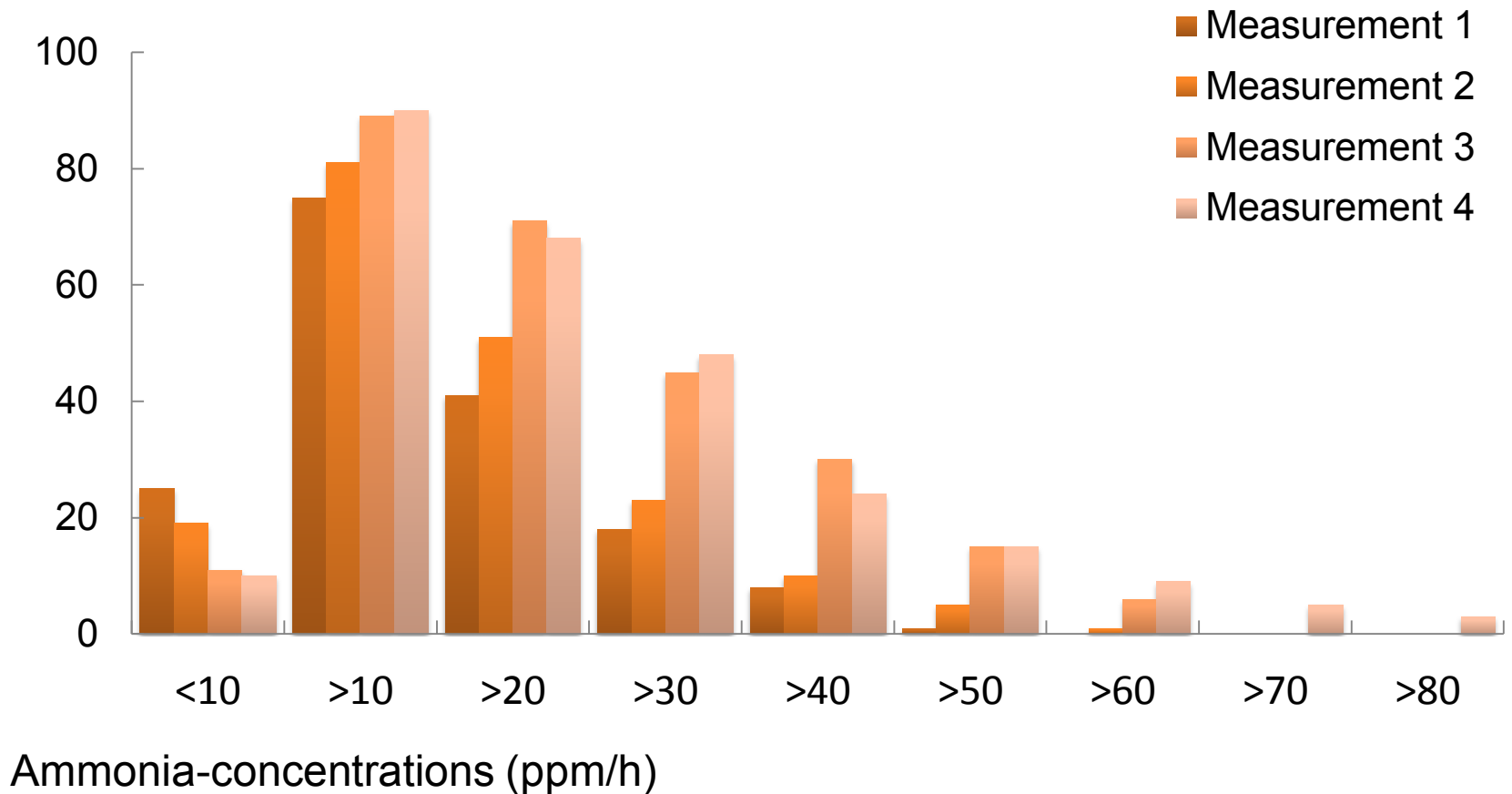


Percentage



# Atmospheric Ammonia Concentrations the Netherlands

(August 1994-December 1994), cumulative

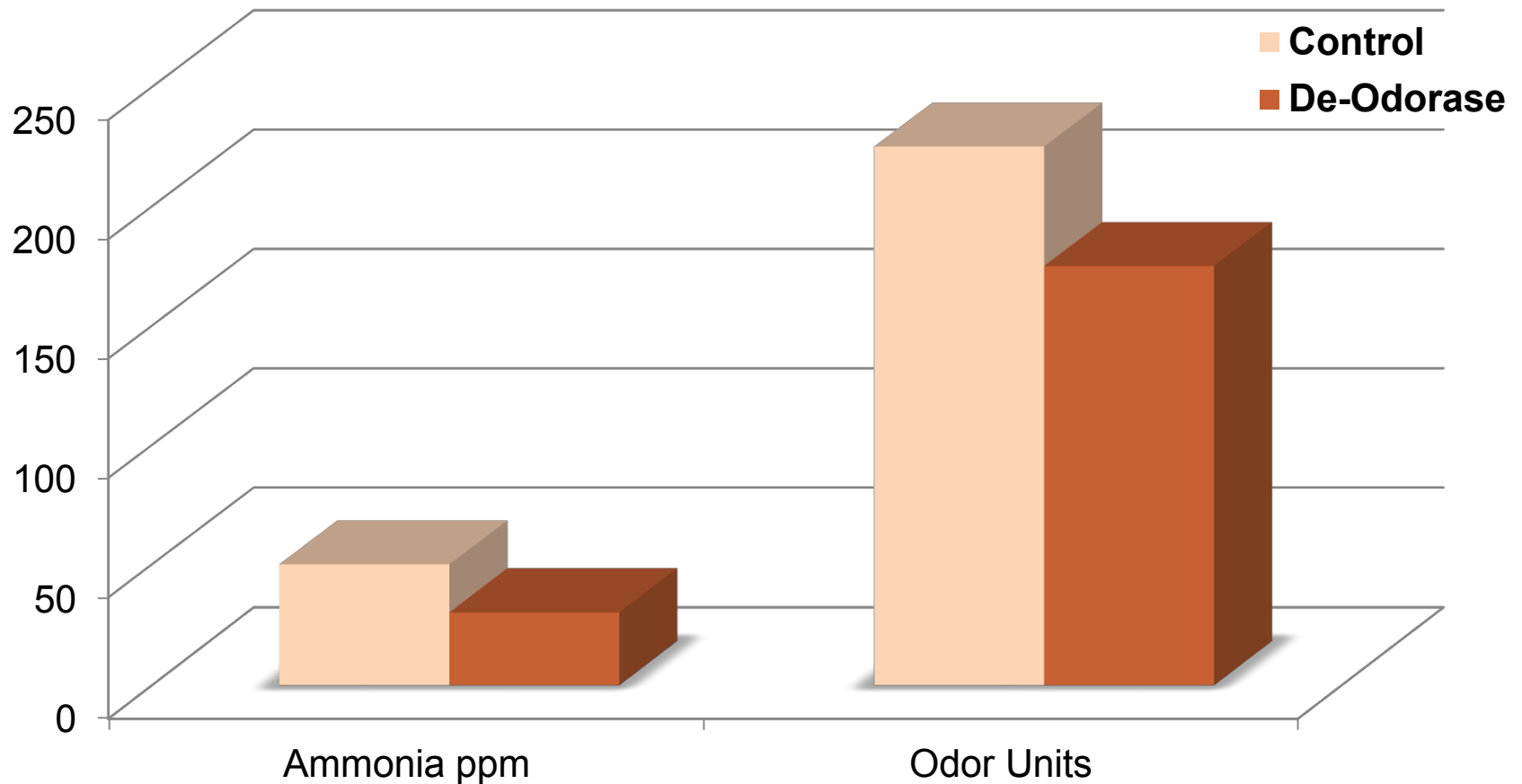


# AURI DE-ODORASE Study



- Conducted in Minnesota grow-finish units (3-1000 hog buildings)
- Ventilated naturally with double sided curtains
- Deep pits beneath slatted floors
- Treatment: DE-ODORASE 30% added initially at 2 oz/100 ft<sup>3</sup> and monthly at 1 oz/100 ft<sup>3</sup>

# Effect of DE-ODORASE Addition on Air Quality Measurements



# Effect of DE-ODORASE Addition on Manure Composition



	Control	De-Odorase
Total N, %	0.68	0.79
Total P, %	0.35	0.65
Total K, %	0.48	0.52

AURI, 1997

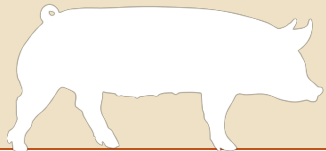
# Effect of DE-ODORASE Addition on Pit Slurry Characteristics



	Control	De-Odorase
Crust thickness	None	None
Depth of solids	12 inches; heavy	No solids
Consistency	Very thick; high solids	Very liquid

AURI, 1997

# The Effect of DE-ODORASE on Performance and Nitrogen Metabolism in Pigs





# Experimental Design



- Treatments:           Control  
                          +DE-ODORASE (120 ppm)  
                          +DE-ODORASE (250 ppm)
- 30 individually fed pigs (initial weight of 55-60 lb)
- Grower (4 weeks) and Finisher diets
- 8-day metabolism studies on weeks 6 & 10

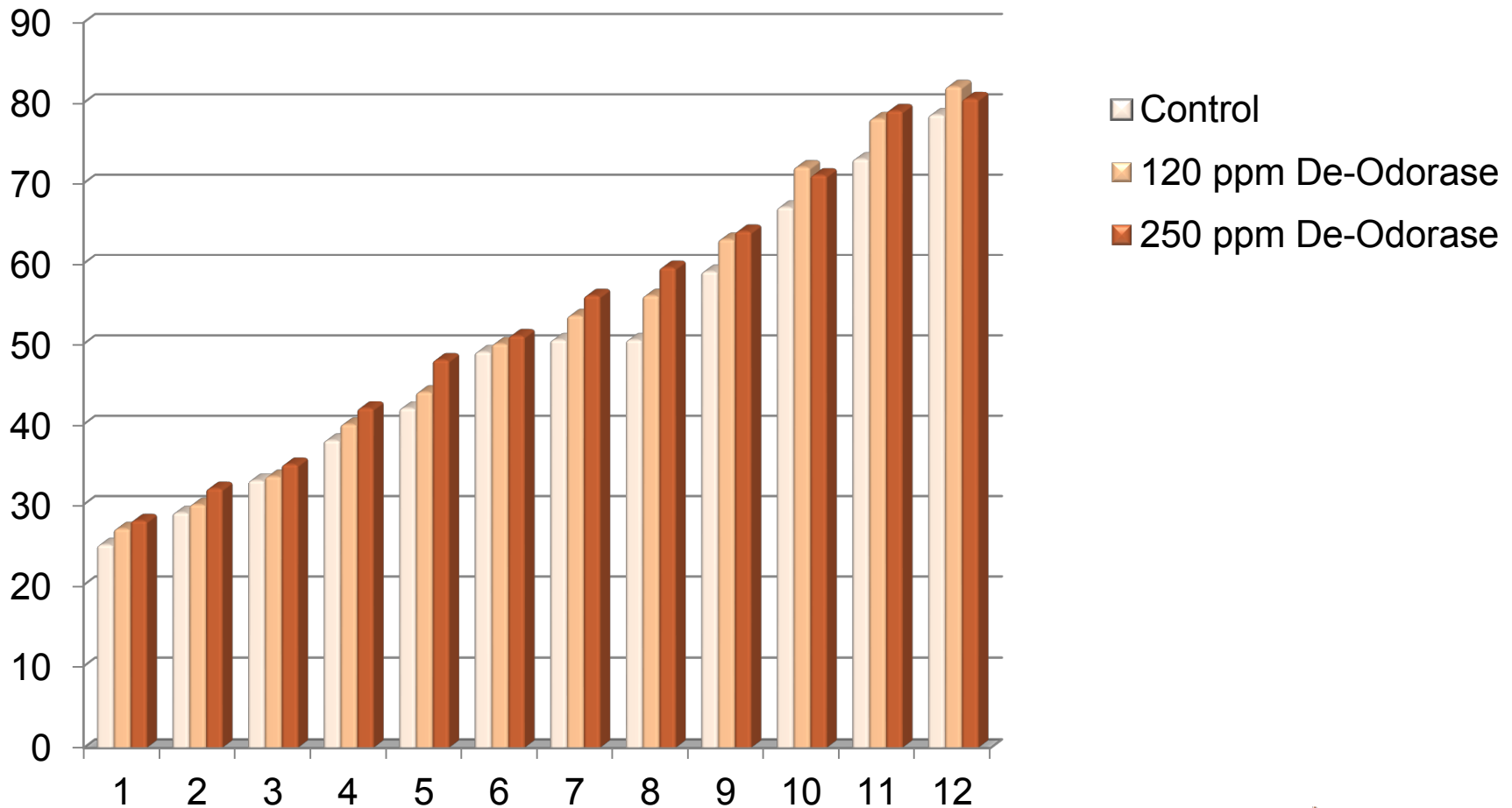
# Effect of DE-ODORASE on Plasma Ammonia and Urea



		Control	De-Odorase
NH <sub>3</sub> , ppm	6 wks	2.88	1.89*
	10 wks	C1.83	1.42
Urea, ppm	6 wks	7.59	6.42
	10 wks	7.43	7.04

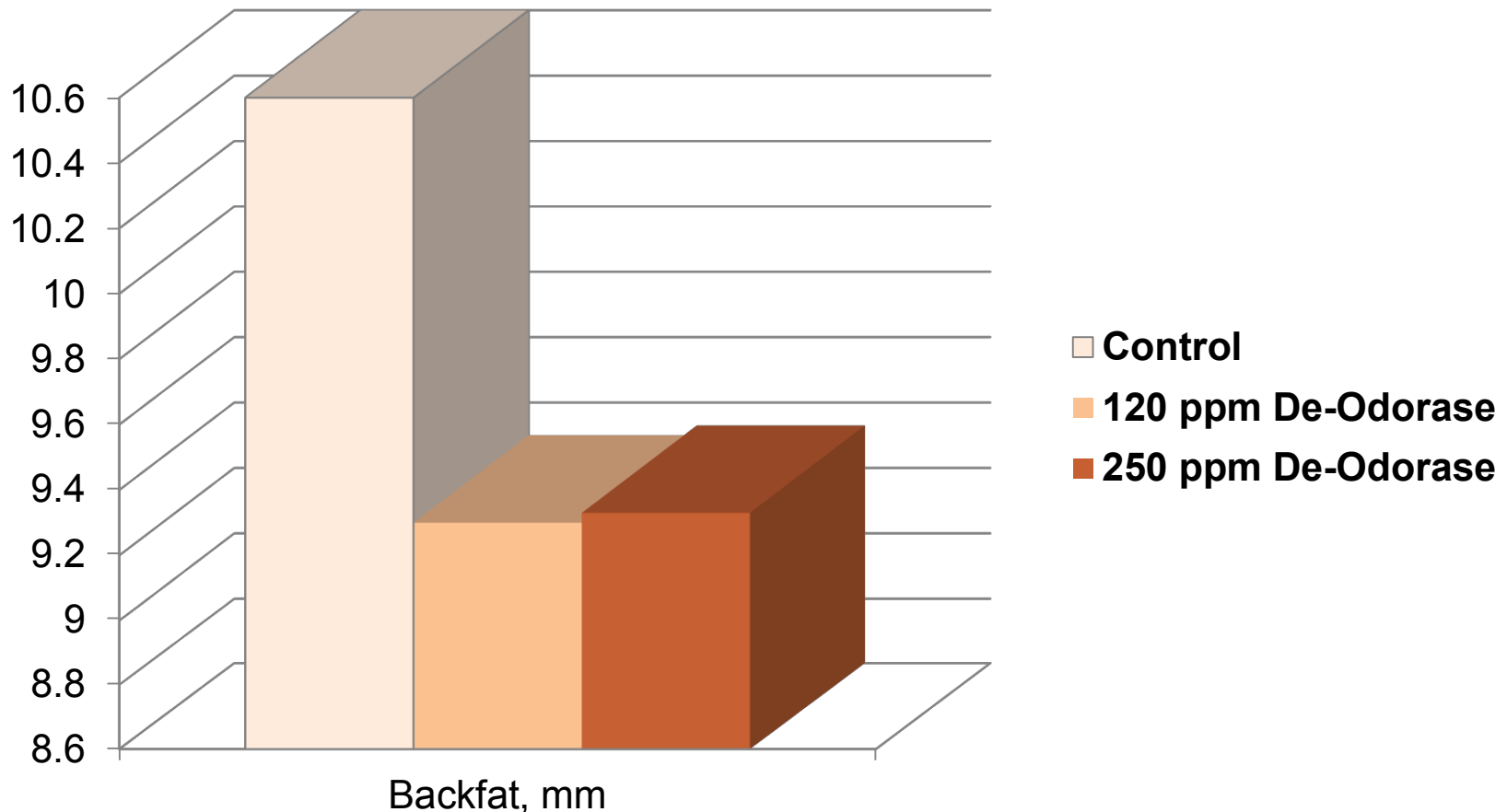
\*P<.05

# Figure 1. Effect of DE-ODORASE Dosage on Body Weight

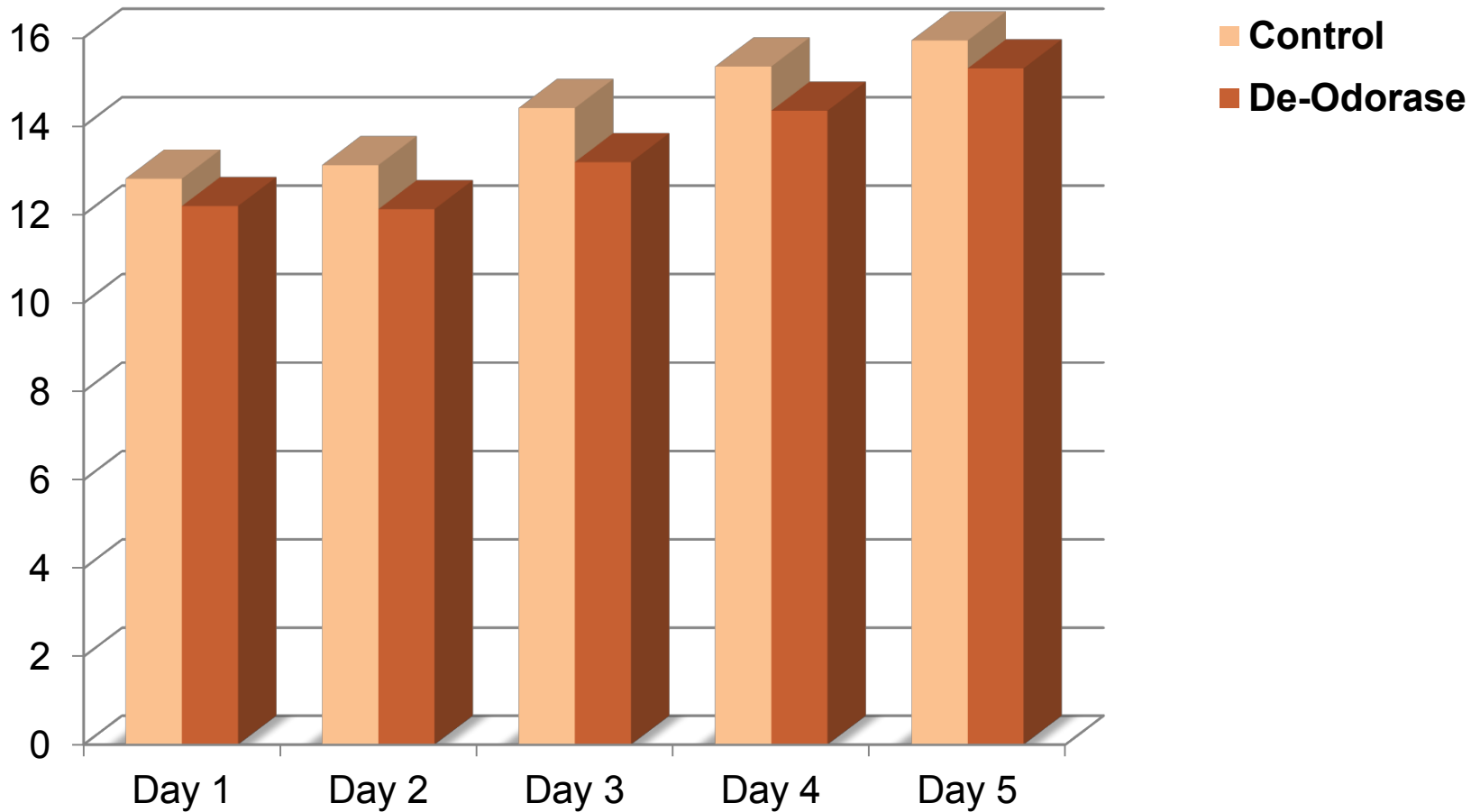


C Duffy.  
Alltech European Bioscience centre

# Figure 2. Effect of De-Odorase Dosage on Backfat Thickness



# Figure 3. Effect of De-Odorase on Urine Ammonia Content



C Duffy.  
Alltech European Bioscience centre

# Results of DE-ODORASE

## Addition to Swine Diets

(Duffy, 1997)

- Pigs receiving DE-ODORASE at 120 ppm had increased body weights.
- Pigs fed DE-ODORASE had reduced P2 backfat thickness.
- DE-ODORASE addition reduced urine ammonia concentration.
- DE-ODORASE fed pigs had lower plasma ammonia and urea.



# Reducing Skatole by the Use of DE-ODORASE\*



Live-weight	95kg			105kg			120kg		
	C	D	impr	C	D	impr	C	D	impr
Number	18	16	---	17	17	---	18	18	---
Daily gain (g)	656	688	+5%	728	778	+7%	697	740	6%
Skatole (ug/g)	0.24	0.16	-33%	0.22	0.16	-27%	0.27	0.21	-22%
Sensory score	0.8	0.5	-38%	0.8	0.7	-13%	1.0	1.2	+17%

\* De-Odorase at 120 g/ tonne

K. ENDER 1995

# Trial Protocol



- Grow-finish study
- 2 groups of pigs per 'split' house
- Control vs. DE-ODORASE in each house
- 25 groups per treatment
- Ammonia measured 4 different times with diffusion tubes (8 hr)

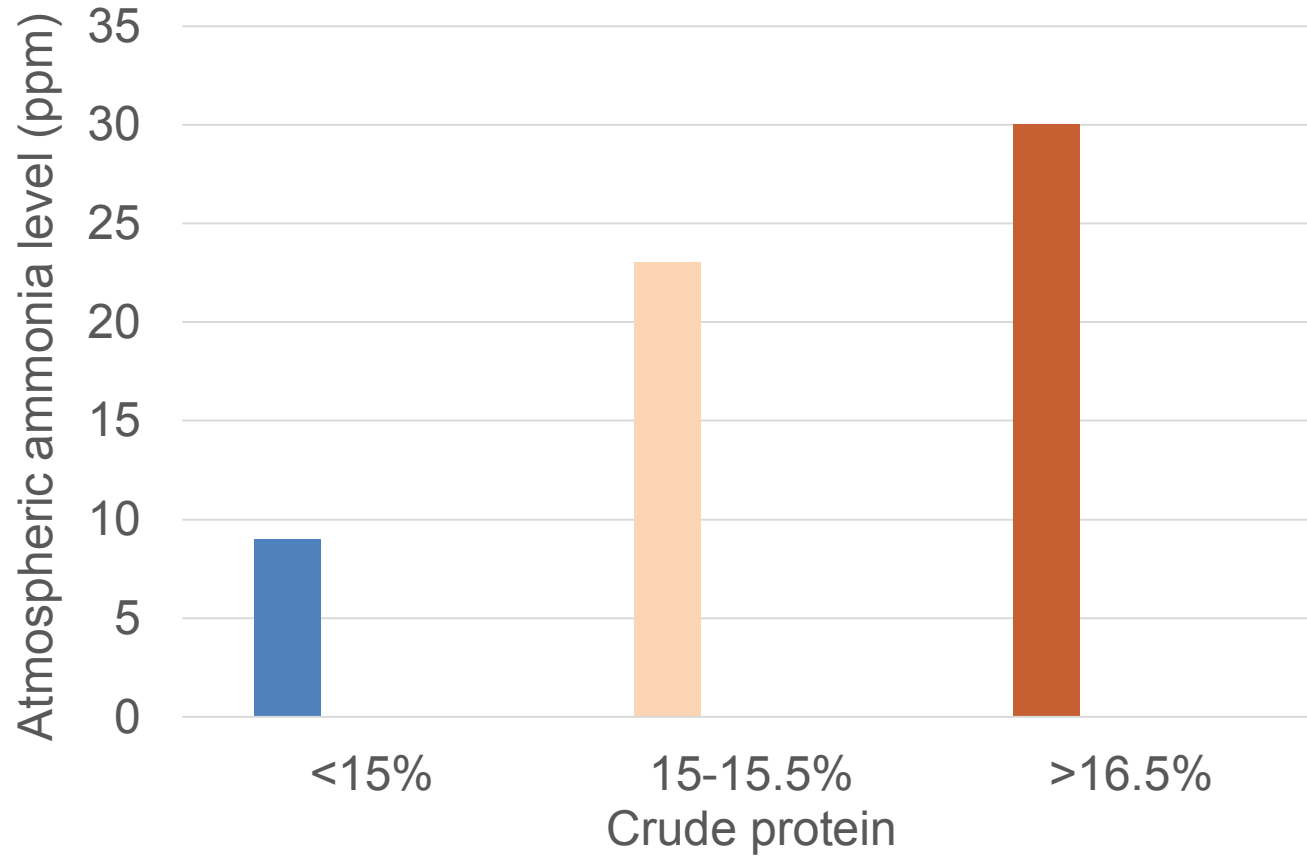


# Comparison of ammonia levels relative to treatment and season



Ammonia (pph/hr)	Control	De-Odorase
Winter	47	33
Summer	27	24

# The influence of dietary crude Protein on atmospheric ammonia levels



Cole et al 1996

# Influence of feeding system on environmental ammonia levels (ppm)



Feeding system	Ammonia (ppm)
Wet, ad libitum	27.5
Wet, restricted	16.8
Wet, phase, ad libitum	16.9
Dry, ad libitum	20.6
Dry, restricted	36.2

# Response of pigs exposed to ammonia and challenged with Pasteurella



NH <sub>3</sub> (ppm)	Pneumonia		Cough index <sup>2</sup>	Daily gain (g/day)
	Frequency	Extent <sup>1</sup>		
<5	13/17	3.6	7.63	641
50	9/10	7.5	7.9	590
100	9/10	6.5	10.7	609

<sup>1</sup> Percentage surface with consolidation.

<sup>2</sup> Number coughing per day/number of pigs in group.

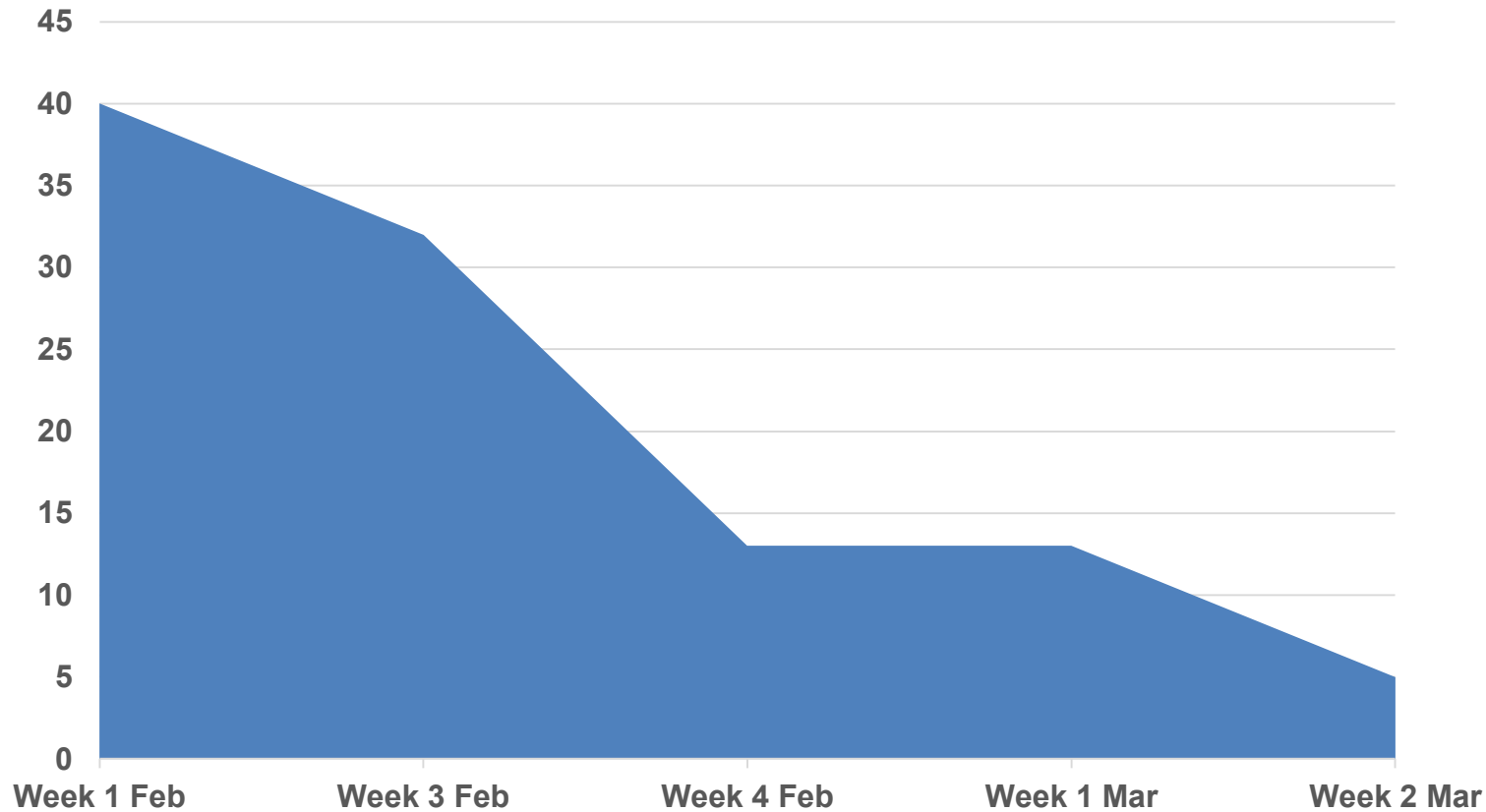
# Effect of De-Odorase and Chlortetracycline on performance of Grower and finisher pigs



	Control	De-Odorase	Chlortetracycline	De-odorase + Chlortetracycline
Daily gain (g/day)				
Grower	530	507	517	530
Finisher	648	666	657	707
Daily intake (kg/day)				
Grower	1.315	1.238	1.297	1.315
Finisher	2.276	2.204	2.344	2.326
FCR				
Grower	2.48	2.44	2.49	2.48
Finisher	3.53	3.32	3.57	3.28
Overall	3.09	2.96	3.12	2.96

Adapted from Mader and Brummm 1987

# Effect of De-Odorase on atmospheric ammonia on a commercial pig farm

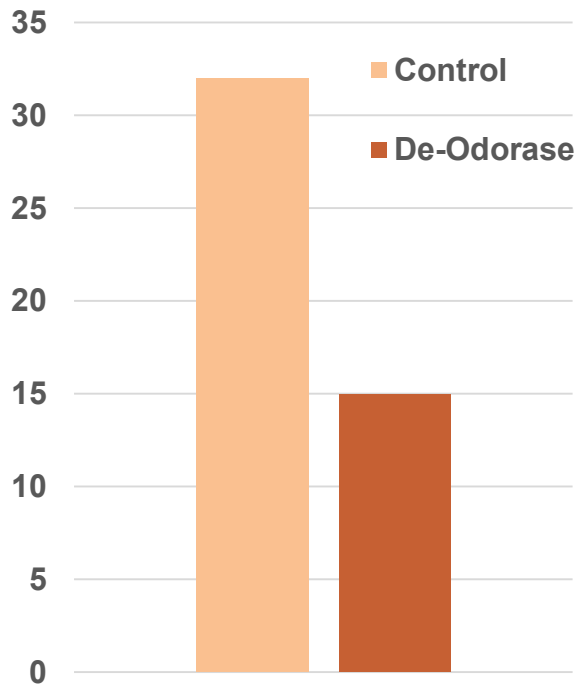


S Borne 1990

# Effect of De-Odorase on atmospheric ammonia reduction



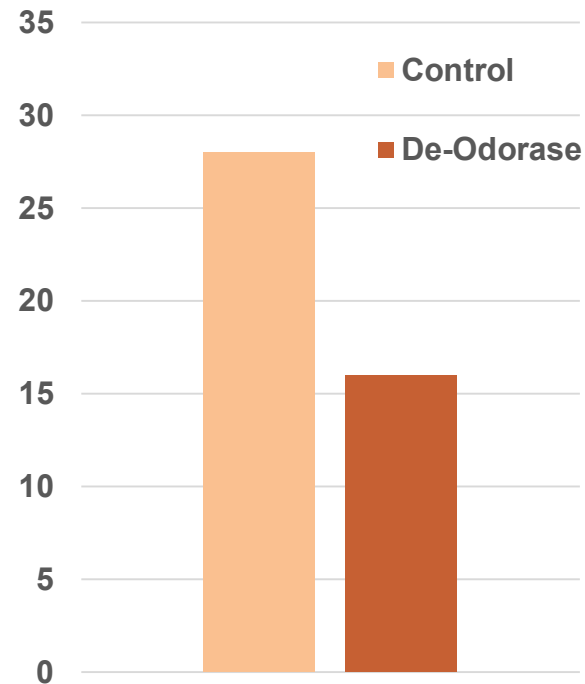
## Ammonia reduced 51%



### School of Agriculture, Caulnes, France

- Finisher pigs, 60/pen, 3 moths
- Ammonia measured with diffusion tubes
- Means of 6 weekly samples beginning at 45 days

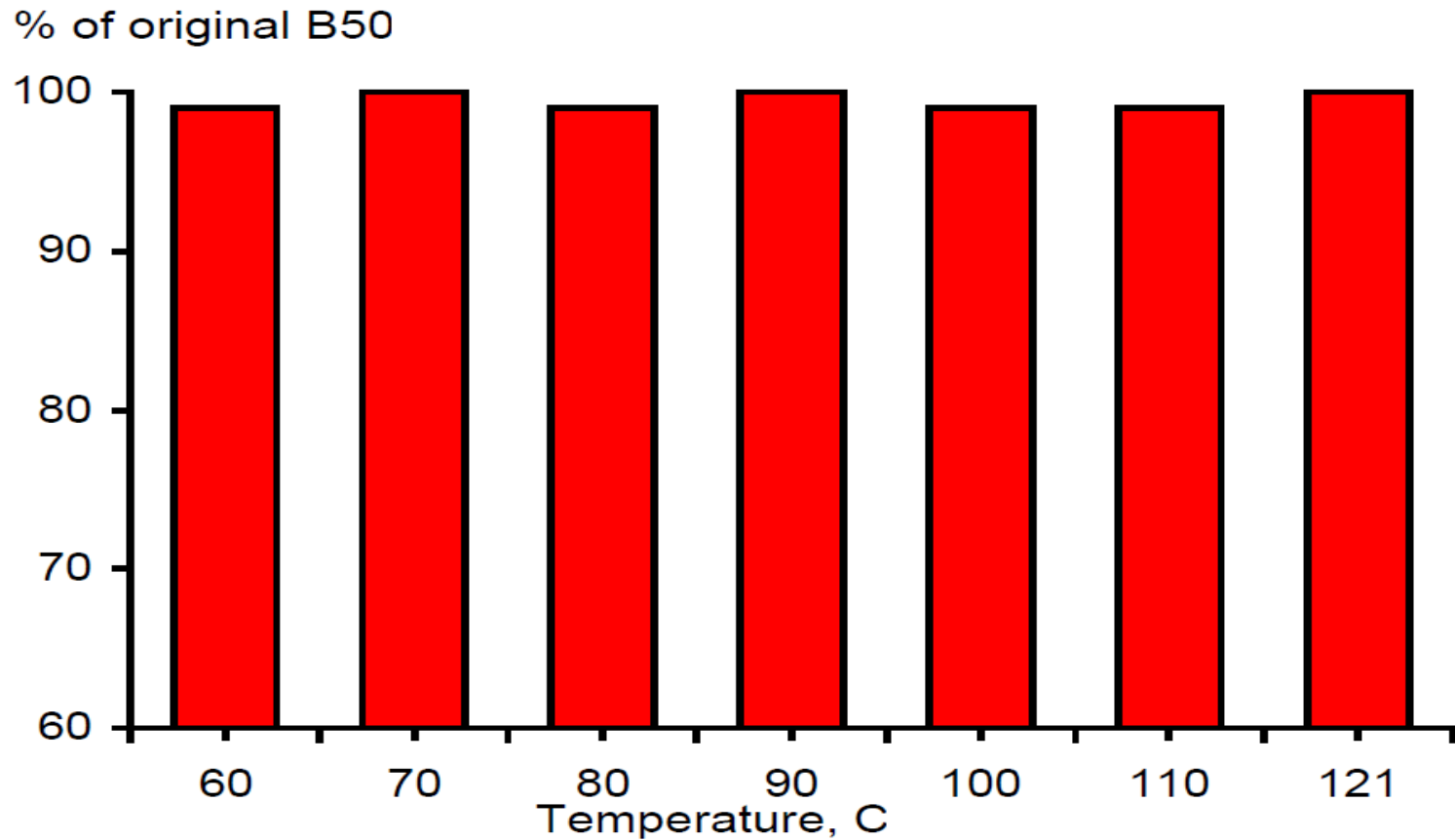
## Ammonia reduced 40%



### Williams, 1991; National Agricultural Centre, Britain

- 160 pigs per treatment
- 60-90 kgs
- Ammonia measured with diffusion tubes at 4 and 6 weeks

# Effect of temperature on ammonia-binding capacity of De-Odorase



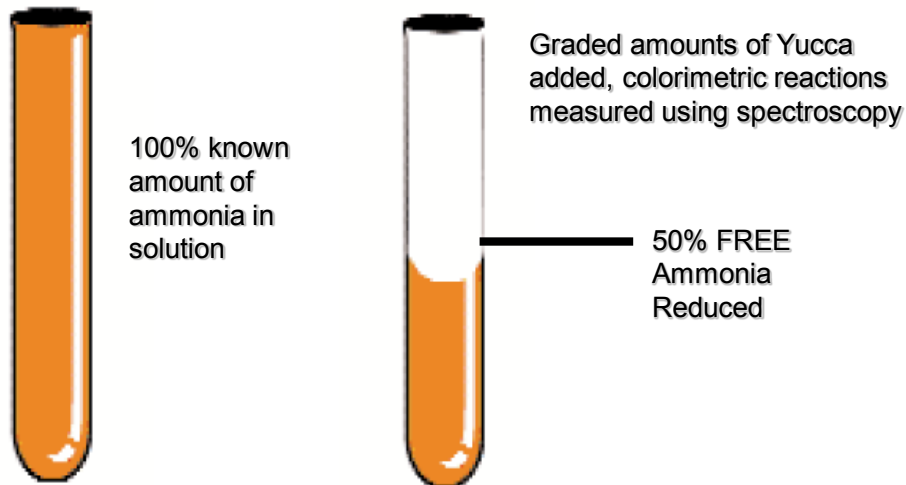


Alltech's B50 quality control procedure is unique to DE-ODORASE.



## B50 Procedure

This determines the amount of yucca extract required to bind 50% of the ammonia ( $\text{NH}_3$ ) in a standard solution



**Lower B50** - The lower the B50 the lower the amount of product needed

**Higher B50** - High B50 values mean that more product is needed to bind the same amount of ammonia (less effective)

## In Summary

## DE-ODORASE

- Improved performance, increased weight gain
- Pigs fed had reduced P2 backfat thickness.
- Reduced urine ammonia concentration.
- Pigs fed had lower plasma ammonia and urea.
- Pigs fed reduced respiratory disease, and increased antibiotic response
- Reduced Skatole and Anderstrone in entire boars
- Reduced complaints of smell and offensive odours
- Improved working conditions for the stock person





Solution to  
Ammonia  
emissions:

**DE-ODORASE<sup>®</sup>**

