

# 24 NutriForum



## Immediate and medium-term challenges for feed formulation in Spain and Europe

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## Focus of presentation



- Raw materials
- Phosphate sources
- Phytase/NSPase
- How does this work in practice?
- How does this impact our formulation now and for the future?



# Raw material

*Selection a key driver of  
animal feed production and  
overall performance in a  
business*



# Raw material availability?

## Typically used sources within the industry:

- Maize/Wheat/Barley/brans etc
- Soyabeans/Expeller/meal/fat
- Rapeseeds/Expeller/meal/fat
- Sunflower/Expeller/meal/fat



# Raw material availability?



## Emerging raw materials:

- Guar meal
- Faba beans/Concentrates
- Peas/Concentrates
- Insect proteins
- Single cell proteins

# Raw material availability?



## Animal by-product material:

- Fishmeal
- Meat meal (Porcine)
- Poultry fat
- Bloodmeal (Porcine)

# Factors affecting raw material availability?

- Raw material Availability dependent on...
- Raw material Quality dependent on...
- Raw material costs



# Raw material - Carbon footprint

Carbon footprint becoming a major driver for:

- Raw material selection...
- Retailers/consumers...
- Media attention...





# Life Cycle Assessment (LCA)

Cereal (Storage agency)	ILCD-CO <sub>2</sub> /kg
Maize	4.44
Wheat	2.77
Barley	2.65
Oats	2.84
Wheat bran	0.64

\*LCA EcoAlim data V8



# Life Cycle Assessment (LCA\*)

Soyabean meal 46/48	ILCD-CO <sub>2</sub> /kg
Average deforestation (crushed in Brazil) at French port	4.19
Average deforestation (Crushed France) at plant	6.65
Not associated to deforestation (crushed Brazil) at French port	6.17
Not associated to deforestation (crushed France) at plant	6.50
Soyabean expeller (French production) at plant	3.24
USA production, (crushed France) at plant	5.04

\*LCA EcoAlim data V8



# Life Cycle Assessment (LCA\*)

Soyabean extruded/Toasted	ILCD-CO <sub>2</sub> /kg
Average deforestation (Brazil origin) at extrusion at French plant	6.77
(French origin) extrusion at French plant	3.13

\*LCA EcoAlim data V8



# Life Cycle Assessment (LCA\*)

Soyabeans	ILCD-CO <sub>2</sub> /kg
French origin at storage agency	1.82
Brazil origin (Average deforestation) at French port	5.95
Brazil origin (Not associated to deforestation)	5.76
USA origin (at French Port)	5.55
Brazil origin (Average deforestation) toasted in France at plant	6.80



\*LCA EcoAlim data V8



# Life Cycle Assessment (LCA\*)

Fat sources	ILCD-CO <sub>2</sub> /kg
Rapeseed oil (French origin) at plant	12.66
Soyabean oil (French origin) at plant	5.46
Soyabean oil (Brazil origin, Av Defor, crushed in France) Port	15.47
Sunflower oil (French origin) at plant	11.98
Sunflower oil (Ukraine) Port	15.93



\*LCA EcoAlim data V8

## Summary of raw materials

- Source of material has significant impact
- GM-Status has not been included
- Other climate factors such as:
  - **Eutrophication/Land use....**
- Makes nutritionist's life even more complex!





# Phosphates

*One of the essential elements for life!*

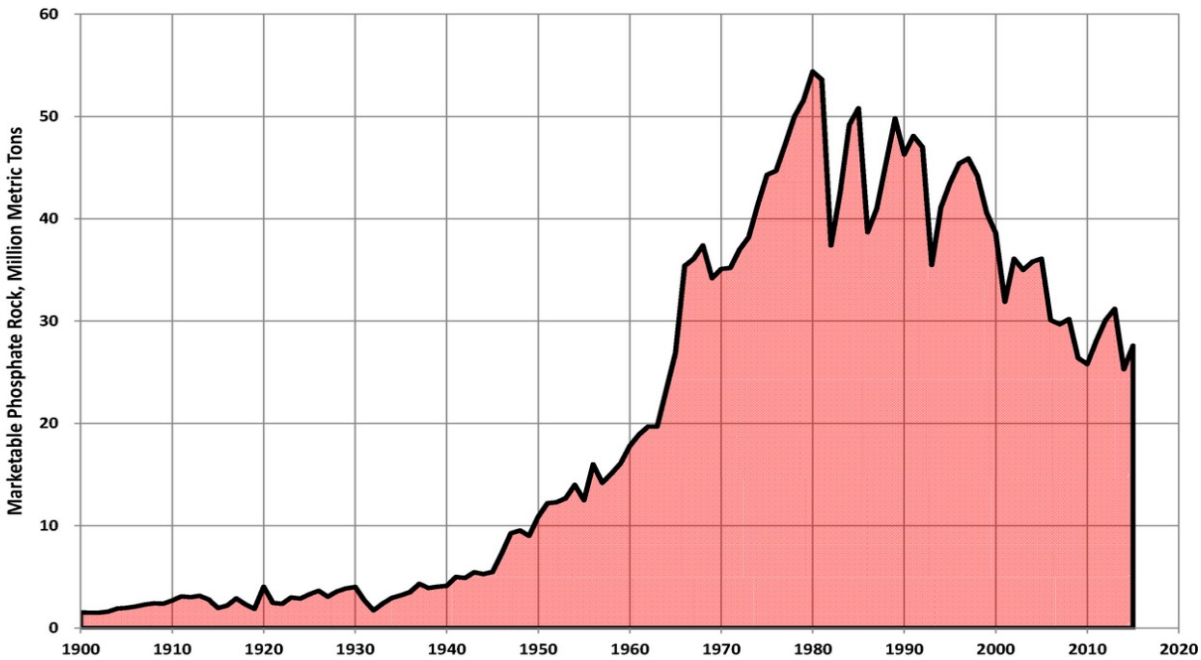
# Phosphate sources



- Current P usage 220MMT/annum
- Phosphates (P) reserves estimated 300 years
- Total estimated global reserves 72 B/MT

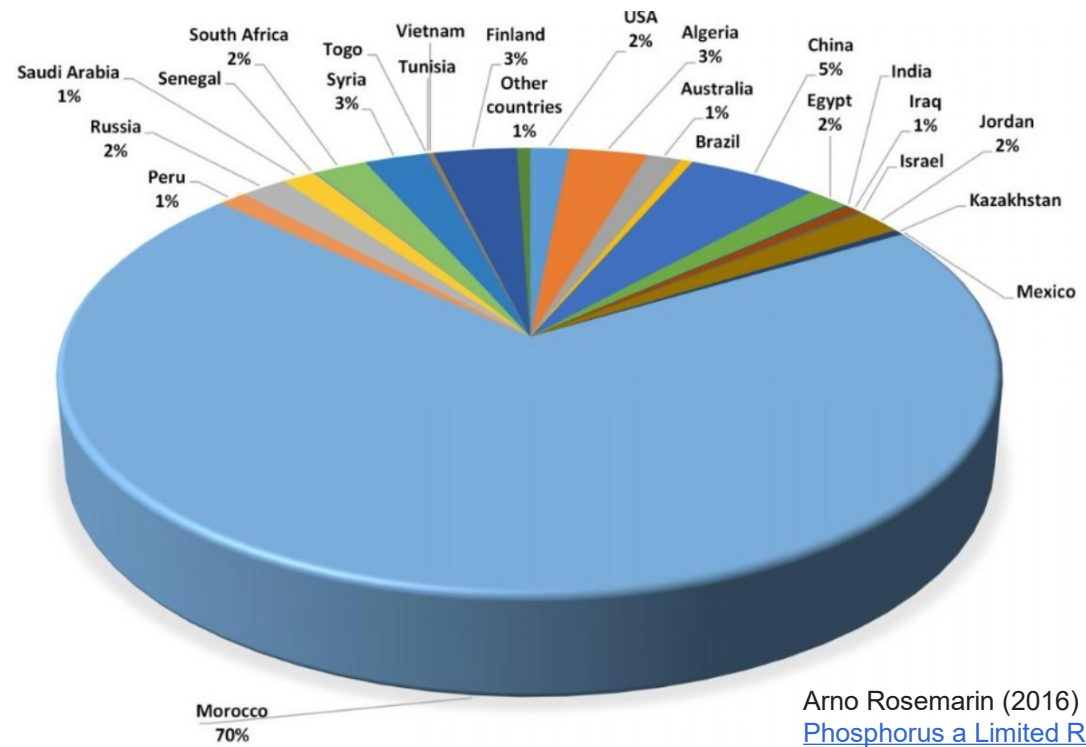


# Phosphate rock mined in USA



Based on US Geological survey data 2022-2023

# Global distribution of commercial P reserves



Arno Rosemarin (2016)  
[Phosphorus a Limited Resource – Closing the Loop](#)  
(based on USGS data)

# Life Cycle Assessment (LCA\*)

Fat sources	ILCD-CO <sub>2</sub> /kg
Mono-Calcium Phosphate (MCP) at plant	15.23
Di-Calcium Phosphate (DCP) at plant	12.56
Calcium carbonate/Limestone at plant	0.82



\*LCA EcoAlim data V8



# Feed enzymes

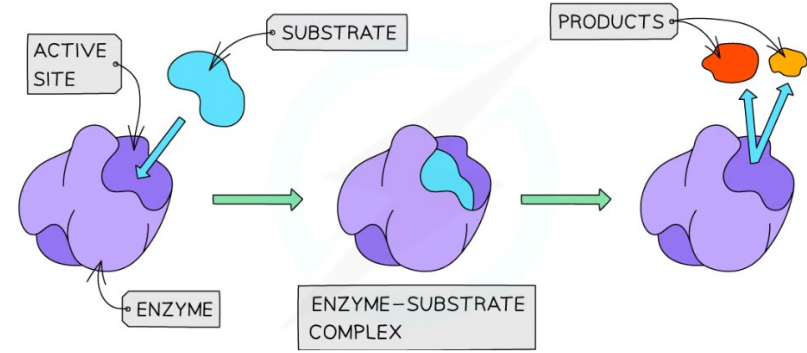
*A way to make a difference in feed formulation and reducing the impact of climate change*



# Feed enzymes

Default enzymes used:

- Phytase
- NSPase...
  - **Xylanase**
  - **Beta glucanase**
  - **Cellulase/Mannase**
- Proteases



# Phytase

Huge impact of feed formulation

Impacts on feed cost

Environmentally a success story



# NSPases-Xylanase/Beta-glucanases

Important in feed formulation

Again positively impacts feed cost

Environmentally a success story



# Protease and mannanase

Still relatively new on feed formulation

Can positively impact performance

Environmental credentials to be assessed...



# Enzyme producers contribution to CO<sub>2</sub> reduction

Manufacturers looking to either offset carbon by:

- Use of renewable energy
- Production material sources re-evaluated
- Increasing concentration
- Upgrading facilities
- Transportation



# Life Cycle Assessment (LCA\*)

Fat sources	ILCD-CO <sub>2</sub> /kg
Phytases (At plant) average of EU based phytases	26.55

\*LCA EcoAlim data V8







# How does this all look in practice?

*2024 trial to evaluate the effects of enzymes on broiler production...*

# Trial conditions

35 day study (Warmia Poland)

10 Pens per treatment

9 birds per pen

90 birds per replicate

0.7m<sup>2</sup> per pen

Diets made at RDS Feeds, Netherlands

All feed pelleted at 80°C



# Treatments

T1: 100% Positive control (No phytase)

T2: (Phytase) 2000\* FTU/kg

T3: (Phytase\*) –CP\*\*

T4: (Phytase\*) -95Kcal energy

T5: (Phytase\*) -95Kcal energy –CP\*\*

T6: (Phytase\*+NSPase) -95Kcal

T7: (Phytase\*+NSPase) -95Kcal –CP\*\*



\*2000FTU/kg

\*\*Crude Protein reduction

# Matrix values used by treatment for phytase

AvP %	Kcal kg	Na %	Lys %	Met %	M+C %	Thr %	Trp %	Val %	Iso %	Arg %
0.23	95	0.029	0.03	0.014	0.023	0.028	0.024	0.024	0.023	0.036

Treatment T2 & T3 No energy sparing utilised  
 Treatment T4-T7 Full matrix utilised  
 NSPase added over the top



# T1: Control diet

	<b>Starter day 0-10</b>	<b>Grower day 11-22</b>	<b>Finisher day 23-35</b>
Cost (Euro)	414.51	398.57	387.84
	%	%	%
Maize	26.51	27.96	30.56
Wheat Soft	24.50	26.78	27.66
Soyabean meal 46%CP	31.00	22.46	12.76
Extruded Full Fat Soya	5.00	10.00	15.00
Rapeseed whole	2.50	3.00	4.00
Rapeseed meal	2.50	3.00	4.00
L-Lysine HCL	0.305	0.256	0.280
DL Methionine	0.378	0.329	0.312
L-Arginine	0.054	0.045	0.079
Threonine	0.188	0.145	0.139
Valine	0.075	0.047	0.063
Limestone fine	1.00	0.94	0.66
Sodium Bicarbonate	0.13	0.13	0.15
MCP Mono Calcium Phosphate	1.91	1.49	1.28
Salt	0.35	0.34	0.32
Choline Chloride 60	0.05	0.06	0.07
Soya oil	2.96	2.42	2.07
Premix Ross 308 Premix inc Coccidiostat	0.6	0.6	0.6

# T1: Control diet

	<b>Starter day 0-10</b>	<b>Grower day 11-22</b>	<b>Finisher day 23-35</b>
[VOLUME]	100	100	100
DM%	88.85	88.71	88.63
PROTEIN %	23.01	21.31	19.53
FAT %	7.40	7.95	8.90
FIBRE %	3.85	3.84	3.86
ASH%	6.29	5.66	4.96
TPHOS %	0.84	0.74	0.68
AV P BR %	0.48	0.40	0.36
<b>ANALYSABLE CA %</b>	<b>0.90</b>	<b>0.80</b>	<b>0.65</b>
SALT %	0.45	0.44	0.43
NA %	0.18	0.17	0.17
CL %	0.32	0.32	0.33
ME CK KCAL/KG	2930	3000	3092.00
DILYS BR %	1.30	1.16	1.06
DITHR BR %	0.87	0.78	0.71
DIMET BR %	0.68	0.62	0.58
DIM+C BR %	0.99	0.90	0.85
DITRP BR%	0.24	0.22	0.19
DIISO BR %	0.87	0.79	0.73
DIVAL BR%	0.99	0.89	0.83
CHOLINE mg/kg	1700.00	1700.00	1700.00
NICARBAZIN mg/kg	40	40	0.00
MONENSIN mg/kg	40	40	100



# T2: Phytase 2000FTU

	Starter day 0-10	Grower day 11-22	Finisher day 23-35
Cost (Euro)	397.51	380.37	371.71
	%	%	%
Maize	27.40	28.90	31.07
Wheat Soft	26.50	28.99	29.52
Soyabean meal 46%CP	30.33	21.69	12.16
Extruded Full Fat Soya	5.00	10.00	15.00
Rapeseed whole	2.50	3.00	4.00
Rapeseed meal	2.50	3.00	4.00
L-Lysine HCL	0.280	0.233	0.254
DL Methionine	0.352	0.304	0.266
L-Arginine	0.026	0.020	0.051
Threonine	0.162	0.120	0.113
Valine	0.052	0.024	0.039
Limestone fine	1.07	1.07	0.96
MCP Mono Calcium Phosphate	0.56	<b>0.00</b>	<b>0.00</b>
Sodium Bicarbonate	0.13	0.13	0.15
Salt	0.27	0.26	0.25
Choline Chloride 60	0.05	0.06	0.07
Soya oil	2.23	1.63	1.51
Premix Ross 308 Premix inc Coccidiostat+phytase	0.60	0.60	0.60

# T2: Phytase 2000FTU

	Starter day 0-10	Grower day 11-22	Finisher day 23-35
[VOLUME]	100	100	100
DM%	88.56	88.40	88.40
PROTEIN %	22.84	21.12	19.33
FAT %	6.71	7.20	8.37
FIBRE %	3.88	3.87	3.88
ASH%	5.14	4.44	4.09
TPHOS %	0.54	0.40	0.39
AV P BR %	0.45	0.34	0.34
<b>ANALYSABLE CA %</b>	<b>0.70</b>	<b>0.60</b>	<b>0.55</b>
SALT %	0.38	0.37	0.36
NA %	0.18	0.17	0.17
CL %	0.28	0.27	0.28
ME CK KCAL/KG	2930	3000	3092.00
DILYS BR %	1.30	1.16	1.06
DITHR BR %	0.87	0.78	0.71
DIMET BR %	0.68	0.62	0.58
DIM+C BR %	0.99	0.90	0.85
DITRP BR%	0.24	0.22	0.19
DIISO BR %	0.87	0.79	0.73
DIVAL BR%	0.99	0.89	0.83
CHOLINE mg/kg	1700.00	1700.00	1700.00
NICARBAZIN mg/kg	40	40	0.00
MONENSIN mg/kg	40	40	100

# T3: Phytase 2000FTU-CP

	Starter day 0-10	Grower day 11-22	Finisher day 23-35
Cost (Euro)	397.73	380.40	371.91
	%	%	%
Maize	30.24	31.99	32.64
Wheat Soft	29.77	31.98	32.63
Soyabean meal 46%CP	24.39	15.81	7.60
Extruded Soyabean FF	5.00	10.00	15.00
Rapeseed Whole	2.50	3.00	4.00
Rapeseed meal 00 <3% fat	2.50	3.00	4.00
L-Lysine HCL	0.450	0.401	0.384
DL Methionine	0.400	0.351	0.302
L-Arginine	0.184	0.176	0.172
Threonine	0.235	0.192	0.169
Valine	0.145	0.117	0.111
Isoleucine	0.113	0.098	0.101
Limestone fine	1.10	1.11	0.99
MCP Mono Calcium Phosphate	0.58	0.00	0.00
Sodium Bicarbonate	0.13	0.13	0.15
Salt	0.28	0.26	0.25
Choline Chloride 60	0.08	0.08	0.09
Soya oil	1.34	0.73	0.85
Premix Ross 308 Premix inc Coccidiostat+phytase	0.52	0.52	0.52

# T3: Phytase 2000FTU-CP

[VOLUME]

DM %

PROTEIN %

FAT %

FIBRE %

ASH %

TPHOS %

AV P BR %

ANALYSABLE CA %

SALT %

K %

NA %

CL %

ME CK KCAL/kg

DILYS BR %

DITHR BR %

DIMET BR %

DIM+C BR %

DITRP BR %

DIISO BR %

DIVAL BR %

CHOLINE mg/kg

NICARBAZIN mg/kg

MONENSIN mg/kg

Starter day 0-10

Grower day 11-22

Finisher day 23-35

100.00

100.00

100.00

88.37

88.21

88.26

21.34

19.64

18.20

5.79

6.28

7.67

3.68

3.66

3.72

4.88

4.18

3.88

0.52

0.38

0.38

0.45

0.34

0.34

0.70

0.60

0.55

0.39

0.38

0.36

0.85

0.79

0.73

0.18

0.17

0.17

0.31

0.31

0.31

2930

3000

3092

1.30

1.16

1.06

0.87

0.78

0.71

0.69

0.63

0.56

0.99

0.90

0.83

0.22

0.19

0.17

0.87

0.79

0.73

0.99

0.89

0.83

1700.00

1700.00

1700.00

40.00

40.00

0.00

40.00

40.00

100.00

1.5%

reduction  
in CP

AvP

reduced v  
control

# T4: Phytase 2000FTU-95Kcal

	<b>Starter day 0-10</b>	<b>Grower day 11-22</b>	<b>Finisher day 23-35</b>
Cost Euro	384.09	367.25	358.61
	%	%	%
Maize	31.26	29.60	31.30
Wheat Soft	27.40	30.26	30.46
Soyabean meal 46%CP	27.36	21.35	12.59
Extruded Soyabean FF	5.00	10.00	15.00
Rapeseed Whole	2.50	3.00	4.00
Rapeseed meal 00 <3% fat	2.50	3.00	4.00
L-Lysine HCL	0.361	0.237	0.237
DL Methionine	0.371	0.301	0.257
L-Arginine	0.100	0.022	0.033
Threonine	0.195	0.120	0.104
Valine	0.093	0.023	0.026
Isoleucine	0.060	0.000	0.013
Limestone fine	1.09	1.07	0.95
MCP Mono Calcium Phosphate	0.57	0.00	0.00
Sodium Bicarbonate	0.13	0.13	0.15
Salt	0.27	0.26	0.25
Choline Chloride 60	0.06	0.06	0.07
Soya oil	0.12	0.00	0.00
Premix Ross 308 Premix inc Coccidiostat+phytase	0.52	0.52	0.52

# T4: Phytase 2000FTU-95Kcal

	<b>Starter day 0-10</b>	<b>Grower day 11-22</b>	<b>Finisher day 23-35</b>
[VOLUME] %	100.00	100.00	100.00
DM %	88.23	88.18	88.20
PROTEIN %	22.17	21.16	19.57
FAT %	4.67	5.61	6.90
FIBRE %	3.82	3.90	3.93
ASH %	5.02	4.44	4.13
TPHOS %	0.53	0.41	0.40
AV P BR %	0.45	0.34	0.34
ANALYSABLE CA %	0.70	0.60	0.55
SALT %	0.38	0.38	0.36
K %	0.91	0.89	0.82
NA %	0.18	0.17	0.17
CL %	0.29	0.28	0.28
ME CK KCAL/kg	2930	3000	3092
DILYS BR %	1.30	1.16	1.06
DITHR BR %	0.87	0.78	0.71
DIMET BR %	0.68	0.60	0.54
DIM+C BR %	0.99	0.90	0.83
DITRP BR %	0.23	0.22	0.20
DIISO BR %	0.87	0.79	0.73
DIVAL BR %	0.99	0.89	0.83
CHOLINE mg/kg	1700.00	1700.00	1700.00
NICARBAZIN mg/kg	40.00	40.00	0.00
MONENSIN mg/kg	40.00	40.00	100.00



# T5: Phytase 2000FTU-95Kcal-CP

	Starter day 0-10	Grower day 11-22	Finisher day 23-35
Cost	385.09	368.51	359.85
	%	%	%
Maize	31.29	33.10	33.75
Wheat Soft	31.28	33.10	33.74
Soyabean meal 46%CP	24.98	18.97	10.29
Extruded Soyabean FF	3.14	5.33	10.93
Rapeseed Whole	2.50	3.00	4.00
Rapeseed meal 00 <3% fat	2.50	3.00	4.00
L-Lysine HCL	0.468	0.406	0.389
DL Methionine	0.399	0.344	0.297
L-Arginine	0.199	0.178	0.175
Threonine	0.240	0.192	0.169
Valine	0.151	0.114	0.108
Isoleucine	0.121	0.097	0.101
Limestone fine	1.11	1.12	0.99
MCP Mono Calcium Phosphate	0.58	0.00	0.00
Sodium Bicarbonate	0.13	0.13	0.15
Salt	0.27	0.26	0.25
Choline Chloride 60	0.08	0.09	0.09
Soya oil	0.00	0.00	0.00
Premix Ross 308 Premix inc Coccidiostat+phytase	0.50	0.50	0.50

# T5: Phytase 2000FTU-95Kcal-CP

	<b>Starter day 0-10</b>	<b>Grower day 11-22</b>	<b>Finisher day 23-35</b>
[VOLUME] %	100.00	100.00	100.00
DM %	88.14	88.01	88.06
PROTEIN %	21.25	19.64	18.20
FAT %	4.15	4.74	6.12
FIBRE %	3.66	3.63	3.69
ASH %	4.86	4.18	3.89
TPHOS %	0.52	0.38	0.38
AV P BR %	0.45	0.34	0.34
ANALYSABLE CA %	0.70	0.60	0.55
SALT %	0.39	0.38	0.37
K %	0.84	0.78	0.72
NA %	0.18	0.17	0.17
CL %	0.31	0.30	0.30
ME CK KCAL/kg	2930	3000	3092
DILYS BR %	1.30	1.16	1.06
DITHR BR %	0.87	0.78	0.71
DIMET BR %	0.69	0.62	0.56
DIM+C BR %	0.99	0.90	0.83
DITRP BR %	0.22	0.20	0.17
DIISO BR %	0.87	0.79	0.73
DIVAL BR %	0.99	0.89	0.83
CHOLINE mg/kg	1700.00	1700.00	1700.00
NICARBAZIN mg/kg	40.00	40.00	0.00
MONENSIN mg/kg	40.00	40.00	100.00

# T6: NSPase+Phytase 2000FTU-95Kcal

	<b>Starter day 0-10</b>	<b>Grower 11-22</b>	<b>Finisher 23-35</b>
Cost Euro	384.74	367.90	359.25
	%	%	%
Maize	31.25	29.59	31.29
Wheat Soft	27.40	30.26	30.46
Soyabean meal 46%CP	27.36	21.35	12.59
Extruded Soyabean FF	5.00	10.00	15.00
Rapeseed Whole	2.50	3.00	4.00
Rapeseed meal 00 <3% fat	2.50	3.00	4.00
L-Lysine HCL	0.36	0.237	0.237
DL Methionine	0.371	0.301	0.257
L-Arginine	0.100	0.022	0.033
Threonine	0.195	0.120	0.104
Valine	0.093	0.023	0.026
Isoleucine	0.060	0.000	0.013
Limestone fine	1.09	1.07	0.95
MCP Mono Calcium Phosphate	0.57	0.00	0.00
Sodium Bicarbonate	0.13	0.13	0.15
Salt	0.27	0.26	0.25
Choline Chloride 60	0.06	0.06	0.07
Soya oil	0.12	0.00	0.00
Premix Ross 308 Inc. Coccidiostat+phytase+NSPase	0.50	0.50	0.50

# T6: NSPase+Phytase 2000FTU-95Kcal

	<b>Starter day 0-10</b>	<b>Grower day 11-22</b>	<b>Finisher day 23-35</b>
[VOLUME] %	100.00	100.00	100.00
DM %	88.23	88.18	88.20
PROTEIN %	22.17	21.16	19.57
FAT %	4.67	5.61	6.90
FIBRE %	3.82	3.90	3.93
ASH %	5.02	4.44	4.13
TPHOS	0.53	0.41	0.40
AV P BR	0.45	0.34	0.34
ANALYSABLE CA	0.70	0.60	0.55
SALT	0.38	0.38	0.36
K	0.91	0.89	0.82
NA	0.18	0.17	0.17
CL	0.29	0.28	0.28
ME CK KCAL	2930	3000	3092
DILYS BR	1.30	1.16	1.06
DITHR BR	0.87	0.78	0.71
DIMET BR	0.68	0.60	0.54
DIM+C BR	0.99	0.90	0.83
DITRP BR	0.23	0.22	0.20
DIISO BR	0.87	0.79	0.73
DIVAL BR	0.99	0.89	0.83
CHOLINE	1700.00	1700.00	1700.00
NICARBAZIN	40.00	40.00	0.00
MONENSIN	40.00	40.00	100.00

# T7: NSPase+Phytase 2000FTU-95Kcal-CP

	<b>Starter day 0-10</b>	<b>Grower day 11-22</b>	<b>Finisher day 23-35</b>
Cost Euro	385.74	369.15	360.50
	%	%	%
Maize	31.28	33.09	33.74
Wheat Soft	31.28	33.10	33.74
Soyabean meal 46%CP	24.98	18.97	10.29
Extruded Soyabean FF	3.14	5.33	10.93
Rapeseed Whole Extruded	2.50	3.00	4.00
Rapeseed meal 00 <3% fat	2.50	3.00	4.00
L-Lysine HCL	0.468	0.406	0.389
DL Methionine	0.399	0.344	0.297
L-Arginine	0.199	0.178	0.175
Threonine	0.240	0.192	0.169
Valine	0.151	0.114	0.108
Isoleucine	0.121	0.097	0.101
Limestone fine	1.11	1.12	0.99
MCP Mono Calcium Phosphate	0.58	0.00	0.00
Sodium Bicarbonate	0.13	0.13	0.15
Salt	0.27	0.26	0.25
Choline Chloride 60	0.08	0.09	0.09
Soya oil	0.00	0.00	0.00
Premix Ross 308 Inc. Coccidiostat+phytase+NSPase	0.50	0.50	0.50

# T7: NSPase+Phytase 2000FTU-95Kcal-CP

	<b>Starter day 0-10</b>	<b>Grower day 11-22</b>	<b>Finisher day 23-35</b>
[VOLUME] %	100.00	100.00	100.00
DM %	88.14	88.01	88.06
PROTEIN %	21.25	19.64	18.20
FAT %	4.15	4.74	6.12
FIBRE %	3.66	3.63	3.69
ASH %	4.86	4.18	3.89
TPHOS %	0.52	0.38	0.38
AV P BR %	0.45	0.34	0.34
ANALYSABLE CA %	0.70	0.60	0.55
SALT %	0.39	0.38	0.37
K %	0.84	0.78	0.72
NA %	0.18	0.17	0.17
CL %	0.31	0.30	0.30
ME CK KCAL/kg	2930	3000	3092
DILYS BR %	1.30	1.16	1.06
DITHR BR %	0.87	0.78	0.71
DIMET BR %	0.69	0.62	0.56
DIM+C BR %	0.99	0.90	0.83
DITRP BR %	0.22	0.20	0.17
DIISO BR %	0.87	0.79	0.73
DIVAL BR %	0.99	0.89	0.83
CHOLINE mg/kg	1700.00	1700.00	1700.00
NICARBAZIN mg/kg	40.00	40.00	0.00
MONENSIN mg/kg	40.00	40.00	100.00

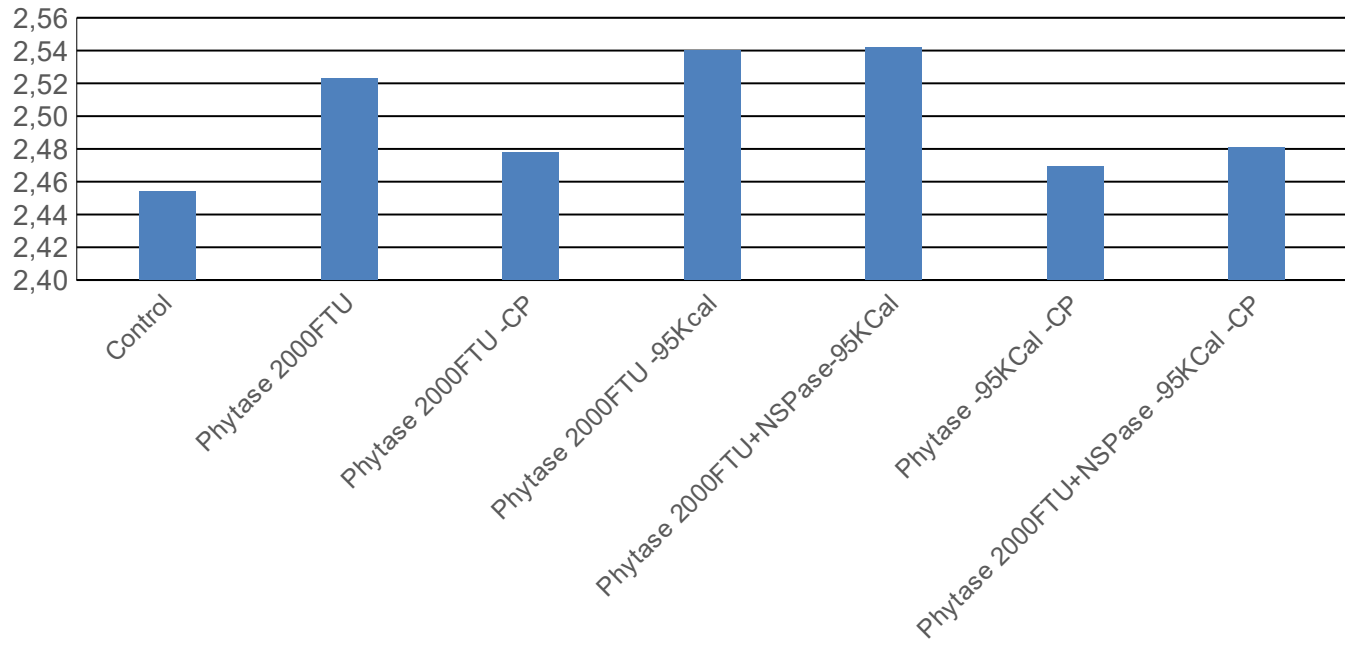


# T1-T7 ILCD (Carbon emission)

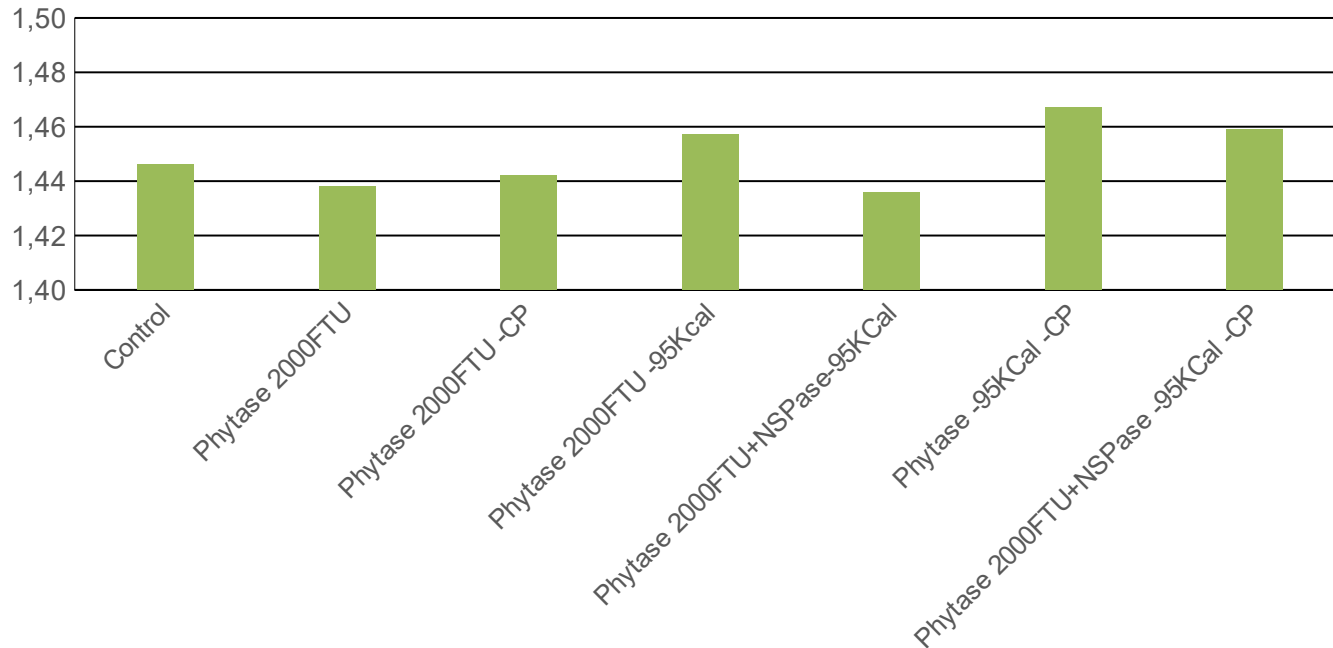
Diet	ILCD-CO2/kg Starter	ILCD-CO2/kg Grower	ILCD-CO2/kg Finisher
T1 Control	1.34	1.25	1.17
T2 Phytase 2000FTU*	1.23	1.14	1.08
T3 Phytase* -CP**	1.17	1.09	1.06
T4 Phytase* -95Kcal	1.11	1.04	0.99
T5 Phytase* -95Kcal-CP**	1.06	0.96	0.95
T6 Phytase*+NSPase-95Kcal	1.06	0.96	0.95
T7 Phytase*+NSPase-95Kcal-CP**	1.06	0.96	0.95



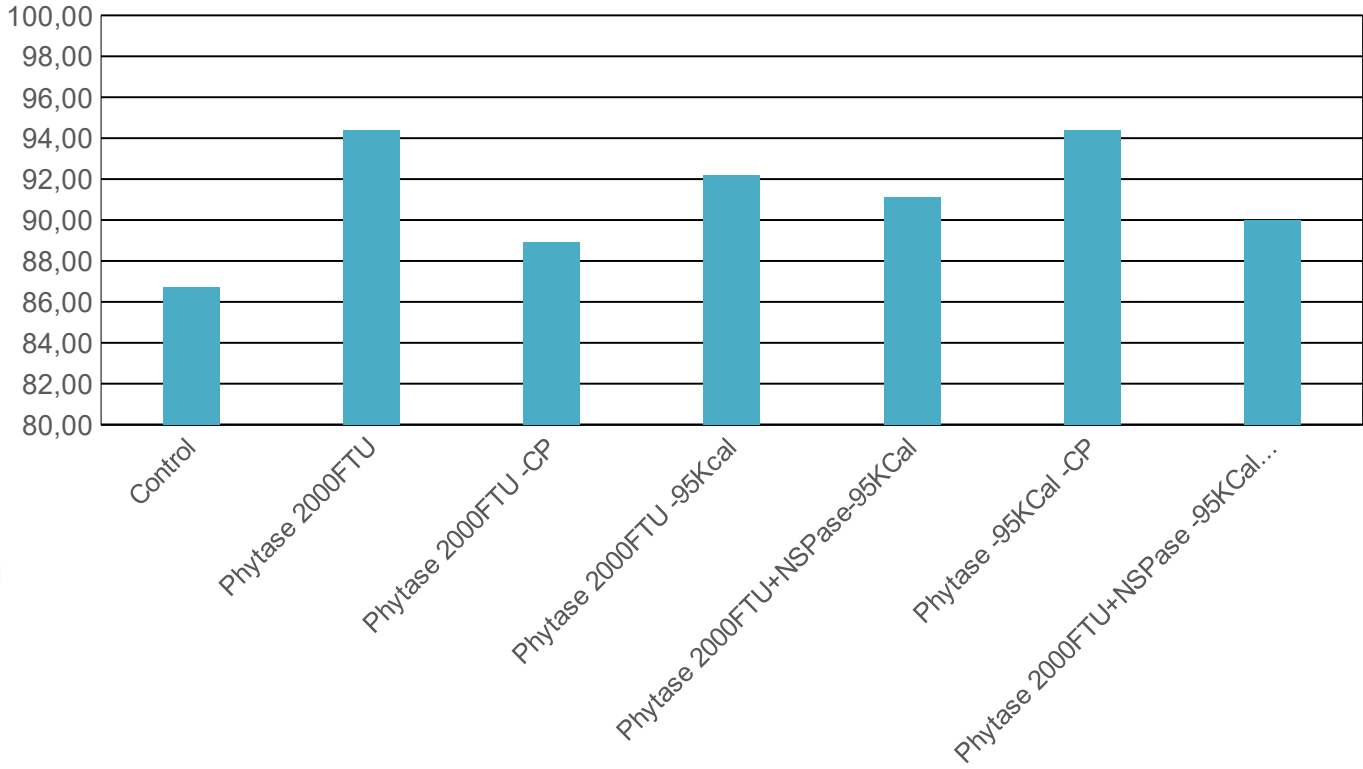
# Final body weights T1-T7



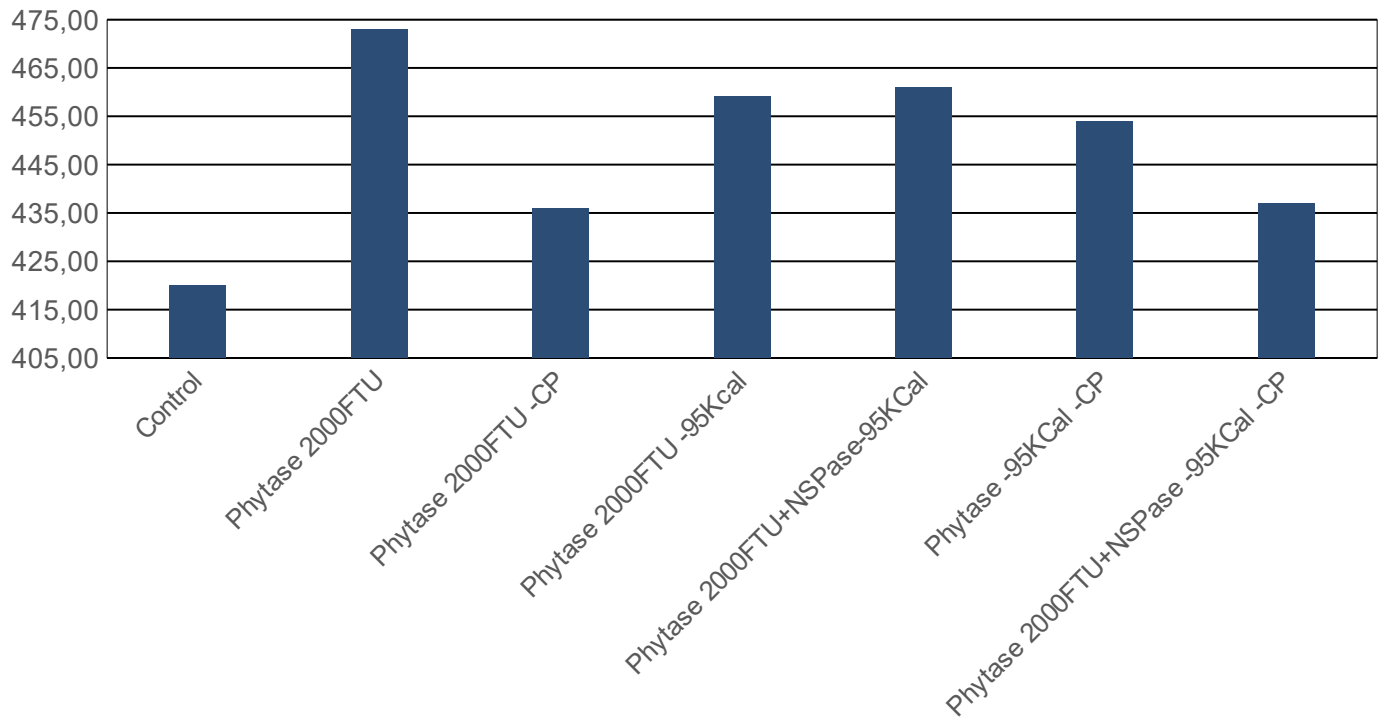
# Feed Conversion Ratio T1-T7



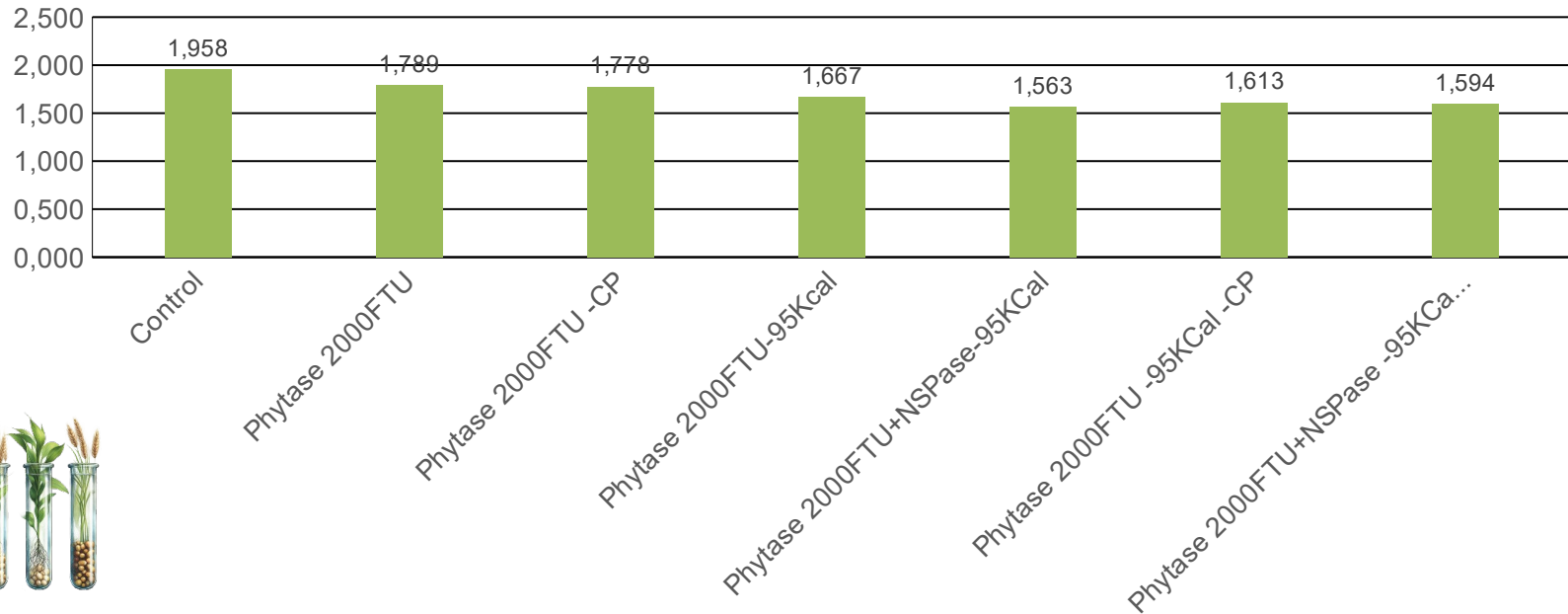
# Liveability T1-T7



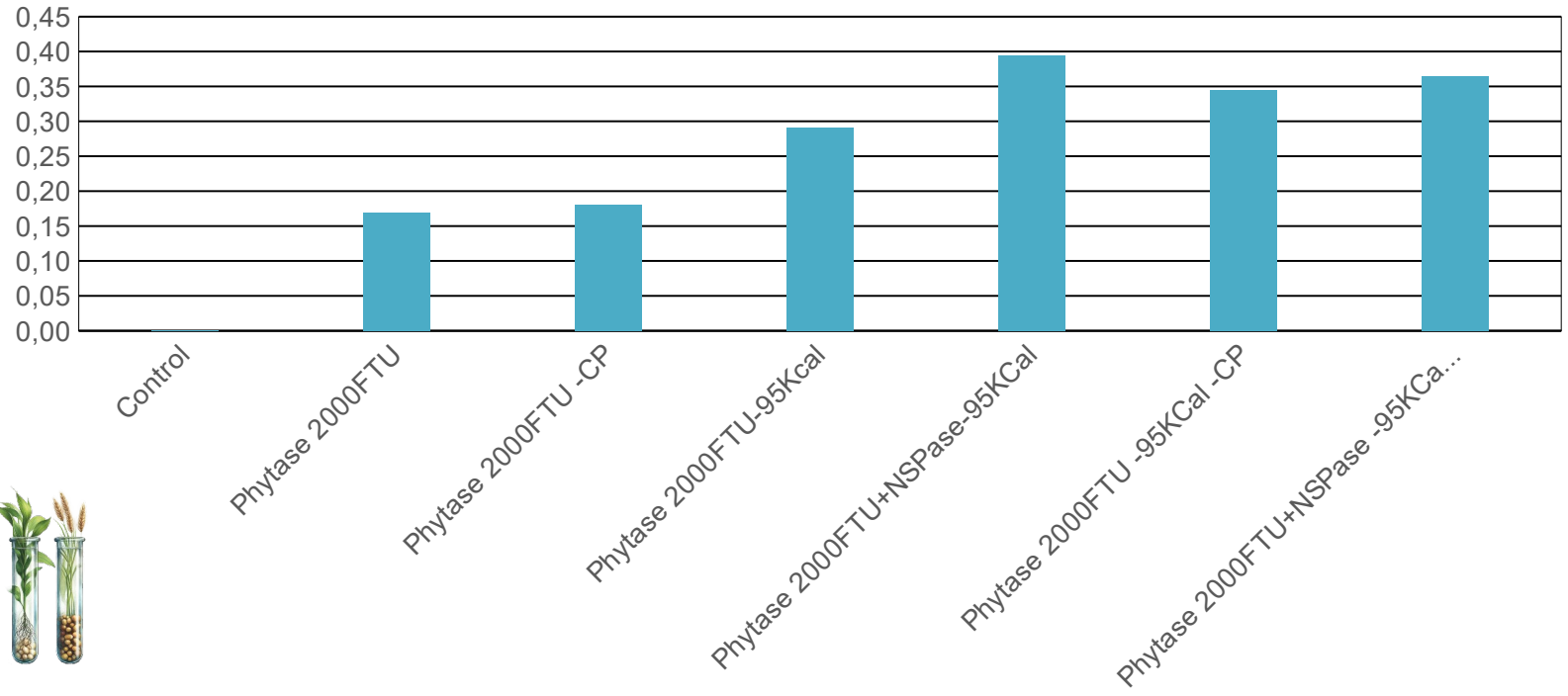
# EPEF T1-T7



# Carbon consumption/kg bird Wgt



# Carbon saving compared to control in kg





# What does this mean for a poultry producer?

Birds per week	Treatment	Consumption CO <sub>2</sub> per bird kg*	CO <sub>2</sub> production/annum in MT
500,000	Control	4.80	124,800
500,000	Phytase 2000FTU+NSPase - 95Kcal	3.97	103,220

**Saving of 21,580MT (-17.3%) of CO<sub>2</sub> Emission**



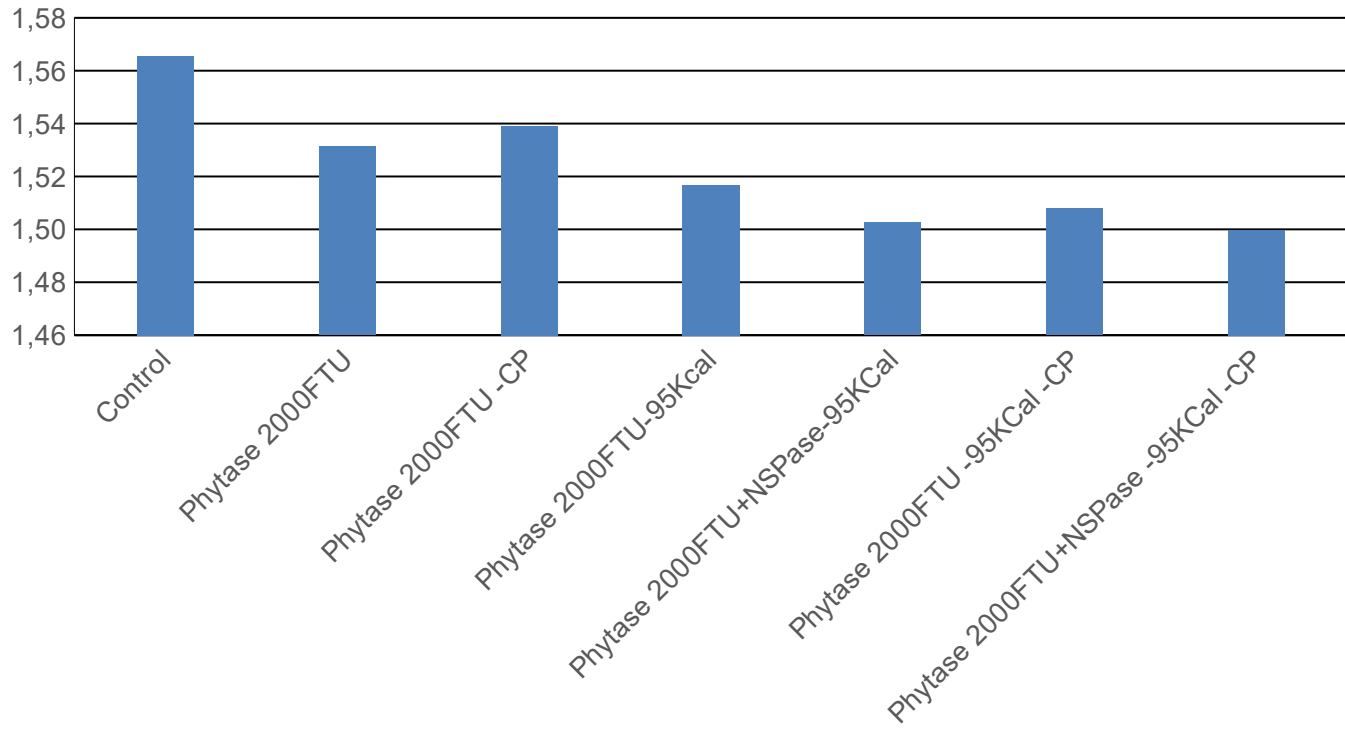




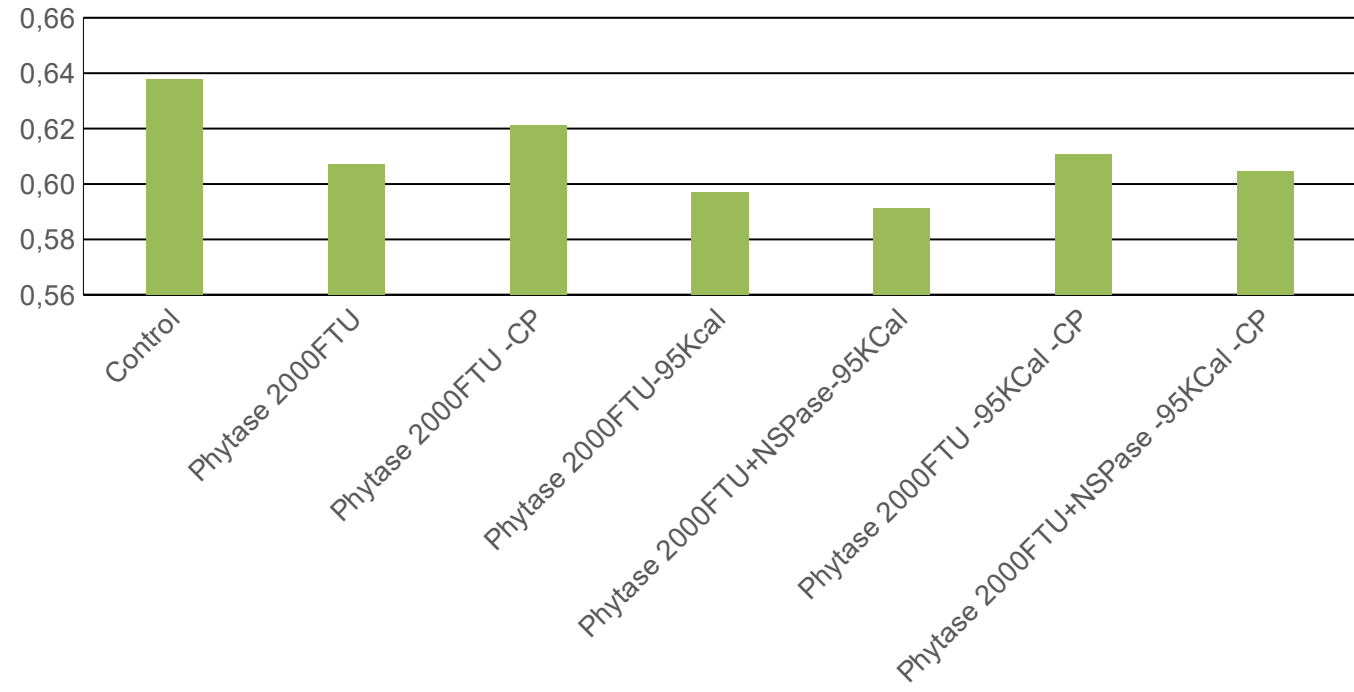
**Does it add up  
economically?**

*€ Cost of production...*

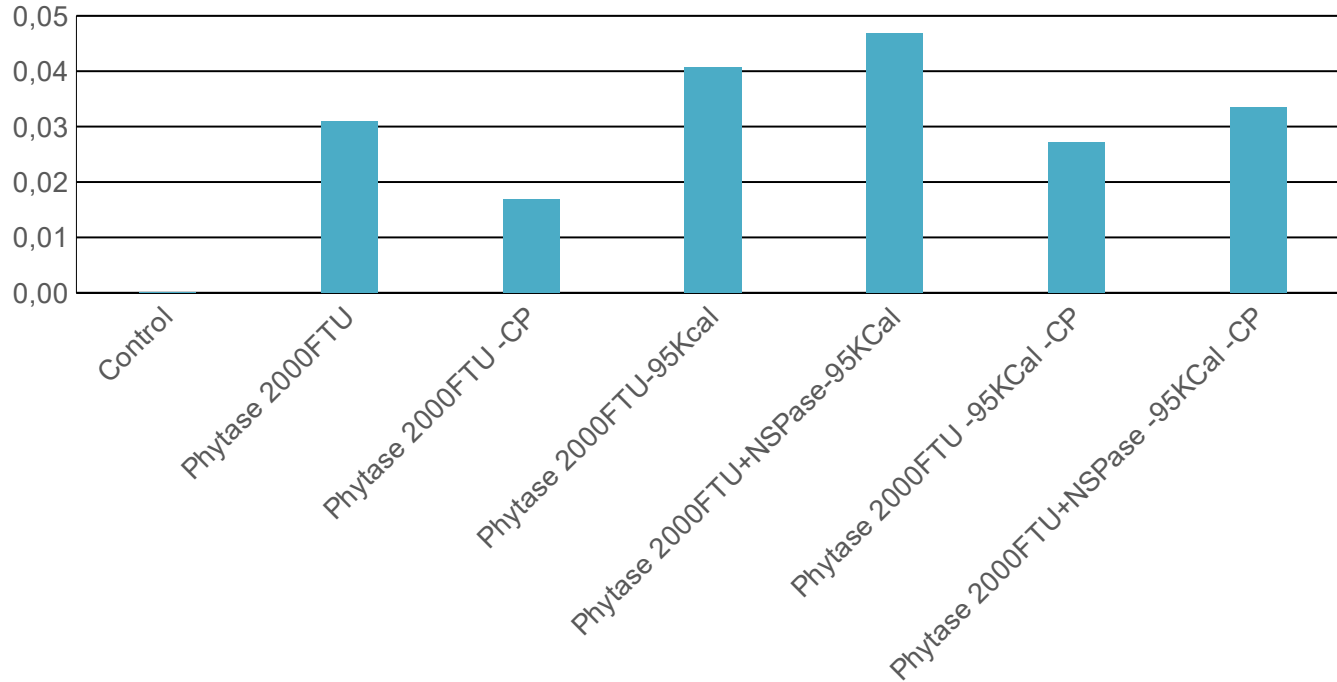
# Total feed cost per bird in €



# Total feed cost per kg of broiler in €



# Savings per kg of broiler produced (€ cents)



# Summary 1

- Large carbon savings can be made when using enzymes at maximum levels
- Reduction of:
  - **MCP**
  - **Crude protein**
  - **Energy savings**



## Summary 2

- Soyabean is largest contributor to CO<sub>2</sub>
- Phytase/NSPase Enzyme CO<sub>2</sub> in typical broiler diet represents less than 0.008% total contribution
- Based on EcoAlim V8 data





# 24 NutriForum



Thank you for  
listening!

