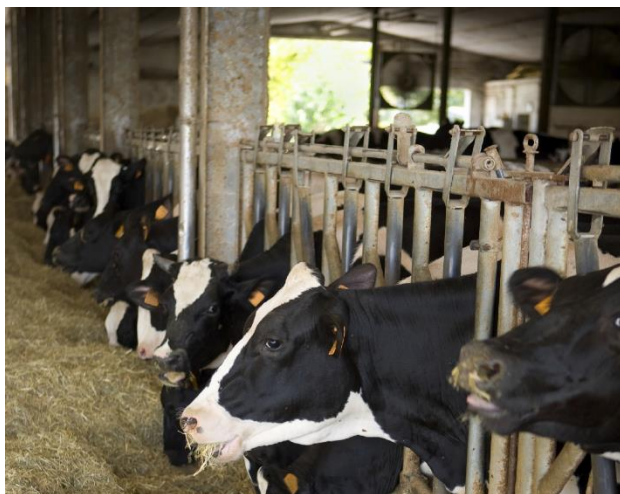


Attapulgate Feed Applications

Four generations of products



Natural products based on
ATTAPULGITE

SANFED[®]
ULTRA

- 1 High toxin binding efficiency
- 2 Reinforced digestive security
- 3 Reduction of diarrheas
- 4 Increase of protein level in milk



Natural products based on
ATTAPULGITE

SANFED[®]
ULTRA

- 1 High toxin binding efficiency
- 2 Improved intestinal health
- 3 Wet litter reduction
- 4 Improved FCR
- 5 Better final weight
- 6 Lower Mortality
- 7 Improved laying percentage
- 8 Improved eggshell thickness

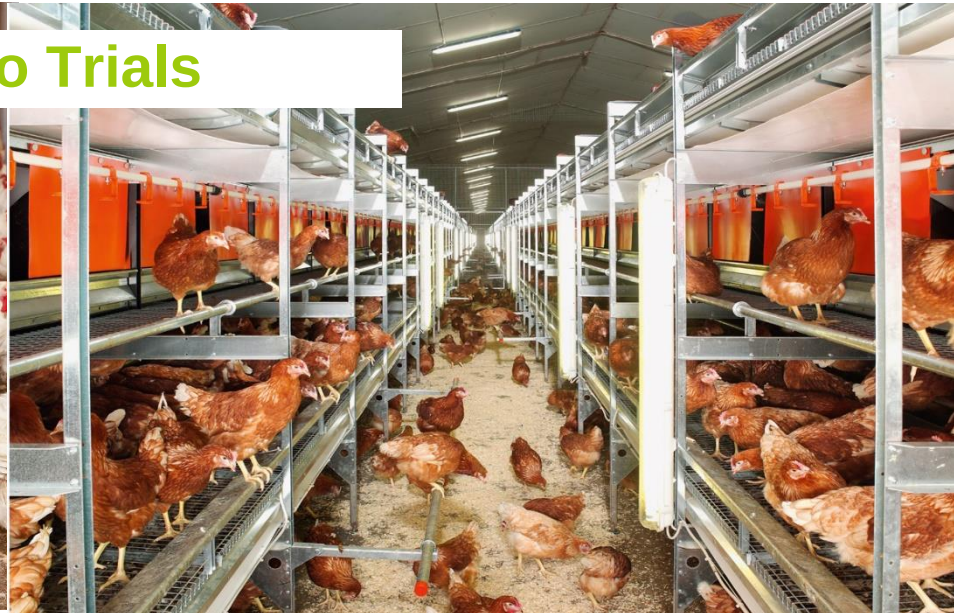


Natural products based on
ATTAPULGITE

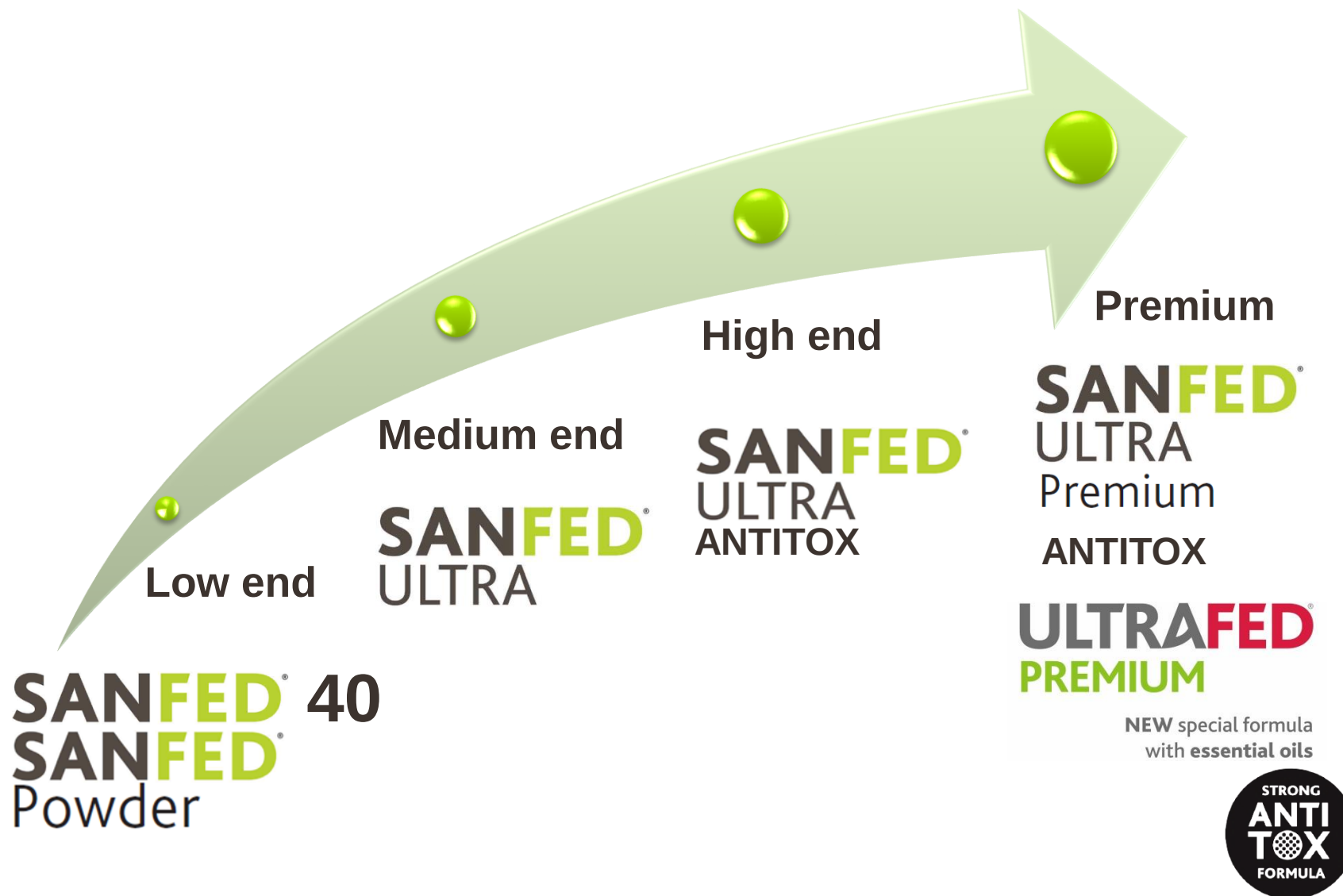
SANFED[®]
ULTRA

- 1 High toxin binding efficiency
- 2 Reinforced digestive security
- 3 Improved intestinal health
- 4 Improved fertility in sows
- 5 Improved FCR
- 6 Improved daily body weight
- 7 Reduction of ammonia emissions

In Vivo Trials



Toxin binders GEOH : Four product generations



«Use of ULTRAFED[®] BROILERS in integrated broiler productions»



Broilers Trial 1/ Ultrafed Broilers (gen.4): Integrator Greece

- (1) FEED PRODUCTION (370,000 birds)
- (2) PRODUCTION UNITS (370,000 birds)
- (3) SLAUGHTER HOUSE (370,000 birds)
- (4) STANDARDIZATION
- (5) TRADING

- ULTRAFED® Broilers
- QUANTITY : 3 Kg / MT feed (4 diets)
- DURATION OF USE : 10 months

RESULTS

- DRY LITTER (Very good health status)
- MORTALITY ; 2.8 %
- FINAL B.W. : 2,700 Kg
- FCR : 1.92
- FINAL WEIGHT : 46 days
- E.P.E.F : 297 (+10 % from previous year 2010)

$$\text{EPEF} = \frac{(100 - \text{Mortality \%}) \times \text{Final B.W.. (Kg)} \times 100}{\text{FCR} \times \text{Slaughter Age (Days)}}$$

Broilers Trial 2/ Ultrafed Broilers (gen.4): Integrator Cyprus

- (1) FEED PRODUCTION (3,000,000 birds)
- (2) PRIVATELY OWNED UNITS (1,500,000 birds)
- (3) COLLABORATING UNITS (1,500,000 birds)
- (4) SLAUGHTER HOUSE (3,000,000 birds)
- (5) STANDARDISATION
- (6) TRADING

Broilers Trial 2/ Ultrafed Broilers (gen.4): Integrator Cyprus

- ULTRAFED® Broilers
- QUANTITY : 3 Kg / MT feed (4 diets)
- DURATION OF USE : 10 months

Broilers Trial 2/ Ultrafed Broilers (gen.4): Integrator Cyprus

TAKE OUT FROM THE DIET THREE PRODUCTS

- (1) Probiotic (1 Kg / MT)
- (2) Acidifier (1 Kg / MT)
- (3) Toxin binder (2 Kg / MT)









- EPEF = European Production Efficiency Factor / Economic index

$(100 - \text{Mortality \%}) \times \text{Weight at slaughter (Kg)} \times 100 / \text{FCR}$

- EPEF = $\frac{\text{-----}}{\text{Slaughter Age (Days)}}$



1ST GROWTH PERIOD



BUILDING	BREED	NUMBER	MORTALITY %	FINAL WEIGHT Kg	FCR	SLAUGHTER AGE Days	EPEF	DIFFERENCE EPEF
38 (2011) 38 (2010)	Ross Ross / Cobb	18,000 21,500	3.55 8.68	3.106 2.622	1.93 2.10	50.5 49.2	307.4 231.7	+ 32.7 %
35 (2011) 35 (2010)	Ross Ross	5,000 5,000	3.38 5.36	2.994 2.912	1.76 2.03	49.6 51.9	331.4 261.6	+ 26.7 %
36 (2011) 36 (2010)	Ross Ross	7,000 8,000	2.79 5.48	2.760 2.829	2.19 2.027	49.7 48.9	246.5 252.3	- 2.3 %
37 (2011) 37 (2010)	Ross Ross	13,000 14,000	4.32 5.61	3.119 3.246	2.23 2.22	53.2 54.7	251.5 252.3	- 0.4 %
32 (2011) 32 (2010)	Flex Ross	9,000 5,500	6.48 8.47	2.917 3.017	2.18 2.30	55.3 54.1	226.3 221.9	+ 2.0 %
30 (2011) 30 (2010)	Cobb Ross	15.300 13,250	8.37 8.81	2.970 3.186	2.18 2.49	50.7 54.4	246.2 214.5	+ 14.8 %
29 (2011) 29 (2010)	Cobb Ross	15,300 14.000	4.90 5.55	2.443 3.123	2.08 2.03	45.3 54.1	246.6 268.6	- 8.2 %
28 (2011) 28 (2010)	Cobb Ross	12,000 11,500	2.36 4.90	2.666 3.015	2.08 2.21	48.3 50.0	259.1 259.5	- 0.2 %
27 (2011) 27 (2010)	Cobb Ross	12,000 11,500	2.77 4.69	2.910 2.703	2.03 2.07	50.8 47.3	274.4 261.2	+ 5.1 %

		1 ST GROWTH PERIOD						
BUILDING	BREED	NUMBER	MORTALITY %	FINAL WEIGHT Kg	FCR	SLAUGHTER AGE Days	EPEF	DIFFERENCE EPEF
22 (2011) 22 (2010)	Cobb --	18,000 --	7,98 --	3.603 --	1.93 --	55.9 --	307.4 --	--
23 (2011) 23 (2010)	Ross Ross	12,000 12,000	3.06 6.08	2.251 3,372	2.22 2,10	48.0 51.3	204.8 293,9	- 30.4 %
24 (2011) 24 (2010)	Cobb Ross	12,000 12,000	3.23 5.38	2.771 3,443	1.86 2.027	49.8 53,2	289.2 295,8	- 2.3 %
25 (2011) 25 (2010)	Ross Ross	12,000 12,000	3.49 3,93	3.000 3.015	2.10 2.30	53.1 50,6	259.6 248,8	+ 4.2 %
26 (2011) 26 (2010)	Cobb Ross	12,000 12,000	3.10 5,09	2.915 3,326	1.94 2.06	51.3 54,2	283.8 282,7	+ 0.4 %
39 (2011) 39 (2010)	Ross Ross	23.000 22,250	3.13 5,92	2.700 2,885	1.98 2.00	47.7 47,9	276.9 283,3	- 2.3 %
33 (2011) 33 (2010)	-- Flex	-- 3.500	-- 11,4	-- 2,395	-- 1,87	-- 45,3	-- 250,5	--
BUILDING	BREED	TOTAL NUMBER OF BIRDS	CORRECTED MORTALITY %		CORRECTED FCR		CORRECTED EPEF	
2011 2010 (+3P)	Ross - Cobb Ross	183,600 178,000	4.11 6.21		2.051 2.131		253 260	

	2 ND GROWTH PERIOD						 GEOHELLAS	
BUILDING	BREED	NUMBER	MORTALITY %	FINAL WEIGHT Kg	FCR	SLAUGHTER AGE Days	EPEF	DIFFERENCE EPEF
38 (2011) 38 (2010)	Ross Ross	18,500 17,000	1.96 4.03	2.896 2.987	2.16 2.10	50.9 51.6	258.2 264.6	- 2.5 %
35 (2011) 35 (2010)	Ross Ross	5,000 5,000	2.54 5.40	2.384 2.952	1.74 2.06	44.7 52.9	298.7 256.3	+ 16.6 %
36 (2011) 36 (2010)	Ross Ross	8,000 7,500	3.21 6.65	2.661 2.784	2.12 2.43	50.7 53.0	239.6 201.8	+ 18.8 %
37 (2011) 37 (2010)	Ross Ross	13,500 14,000	2.21 5.65	2.623 2.790	1.96 2.05	47.9 45.6	273.2 281.6	- 3.0 %
32 (2011) 32 (2010)	Ross Ross	9,000 9,000	3.17 6.36	2.690 2.464	1.99 2.25	50.2 46.8	260.7 219.1	+ 19.0 %
30 (2011) 30 (2010)	Ross Ross	16.000 14,000	5.27 5.96	2.432 2.336	1.95 2.05	46.0 44.6	256.8 240.3	+ 6.9 %
29 (2011) 29 (2010)	Ross Ross	15,500 14.000	3.97 3.44	2.297 3.186	1.89 2.13	45.9 52.2	254.3 276.7	- 8.1 %
28 (2011) 28 (2010)	Ross Ross	13.250 12,000	2.57 5.24	2.563 2.657	2.11 2.04	48.2 47.0	245.5 262.6	- 6.6 %
27 (2011) 27 (2010)	Ross Ross	13,250 12,200	2.16 3.29	2.625 3.025	2.12 2.02	48.9 54.2	247.7 267.2	- 7.3 %

 2ND GROWTH PERIOD 								
BUILDING	BREED	NUMBER	MORTALITY	FINAL WEIGHT	FCR	SLAUGHTER AGE	EPEF	DIFFERENCE EPEF
			%	Kg		Days		
22 (2011)	Ross	6,000	3.22	2.714	2.09	51.6	243.6	--
22 (2010)	--	--	--	--	--	--	--	
23 (2011)	Ross	13,000	2.11	2.316	1.76	46.5	277.0	- 0.1 %
23 (2010)	Ross	12,250	4.66	2.558	1.99	44.2	277.3	
24 (2011)	Ross	12,500	2.68	2.414	1.84	48.3	264.4	- 2.1 %
24 (2010)	Ross	12,250	3.88	2.742	2.10	46.5	269.9	
25 (2011)	Ross	12,500	1.51	2.441	1.85	47.2	275.3	+ 15.4 %
25 (2010)	Ross	12,200	3,84	2.731	2.20	50.0	238.7	
26 (2011)	Ross	13,000	3.02	2.426	1.90	48.4	255.8	+ 10 %
26 (2010)	Ross	12,200	3.76	2.634	2.28	47.8	232.6	
39 (2011)	Ross	22.000	3.08	2.581	1.80	43.1	322.4	- 6.2 %
39 (2010)	Ross	22,000	3.83	3.026	1.85	45.8	343.5	
18 (2011)	Ross	17,000	2.07	2.534	2.30	45.4	237.7	--
18 (2010)	--	--	--	--	--	--	--	
19 (2011)	Ross	19,000	1.80	2.360	1.90	45.2	269.85	--
BUILDING	BREED		TOTAL NUMBER OF BIRDS	CORRECTED MORTALITY %		CORRECTED FCR		CORRECTED EPEF
2011  2010 (+3P)	Ross		227,000	2.72		1.97		285
	Ross		163,350	4.86		2.24		246



3rd GROWTH PERIOD



BUILDING	BREED	NUMBER	MORTALITY %	FINAL WEIGHT Kg	FCR	SLAUGHTER AGE Days	EPEF	DIFFERENCE EPEF
38 (2011) 38 (2010)	Ross Ross	18,500 19,000	2.62 6.27	2.482 2.415	1.96 2.00	46.6 44.1	264.6 256.6	+ 3.2 %
35 (2011) 35 (2010)	Ross Ross	5,000 5,000	2.64 5.36	2.830 3.038	1.89 2.05	50.9 54.2	286.4 258.8	+ 10.7 %
36 (2011) 36 (2010)	Ross Ross	8,000 8,000	4.74 6.43	2.688 2.875	2.10 1.97	53.4 52.3	228.3 261.1	- 12.6 %
37 (2011) 37 (2010)	Ross Ross	13,000 16,000	3.12 6.18	2.641 2.807	1.93 2.21	49.2 50.9	269.5 234.1	+ 15.2 %
32 (2011) 32 (2010)	Ross Ross	9,000 9,000	5.53 7.86	2.538 2.682	2.15 2.25	46.9 54.6	237.8 201.2	+ 18.2 %
30 (2011) 30 (2010)	Ross Ross	15.000 15,000	2.89 8.71	2.652 3.034	2.25 2.11	50.5 48.6	226.7 270.1	- 16.1 %
29 (2011) 29 (2010)	Ross Ross	15,000 15.000	3.25 4.84	2.609 2.880	1.95 2.13	49.4 47.3	262 272	- 3.7 %
28 (2011) 28 (2010)	Ross Ross	13,500 12,000	1.33 10.93	2.593 3.134	2.08 2.53	48.3 52.7	254.7 209.4	+ 21.7 %
27 (2011) 27 (2010)	Ross Ross	13,500 12,000	1.70 6.04	2.869 3.238	2.16 1.98	54.6 54.9	239.1 279.9	- 14.6 %

ULTRAFED BROILERS			GEONILLAS					
BUILDING	BREED	NUMBER	MORTALITY	FINAL WEIGHT	FCR	SLAUGHTER AGE	EPEF	DIFFERENCE EPEF
			%	Kg		Days		
22 (2011)	Ross	6,000	2.47	2.826	2.28	51.5	234.7	--
22 (2010)	--	--	--	--	--	--	--	
23 (2011)	Ross	13,000	1.20	2.654	2.17	51.4	235.1	- 24.5 %
23 (2010)	Ross	12,500	3.78	2.745	1.92	44.2	311.2	
24 (2011)	Ross	13,000	0.98	2.489	1.96	49.3	255.1	- 17.9 %
24 (2010)	Ross	12,500	6.33	3.000	1.89	47.9	310.4	
25 (2011)	Ross	13,500	1.32	2.486	2.06	49.5	240.6	+ 3.3 %
25 (2010)	Ross	12,000	10,72	3.145	2.26	53.3	233.1	
26 (2011)	Ross	13,500	1.05	2.766	2.13	51.9	247.6	+ 20.0 %
26 (2010)	Ross	12,000	17.10	3.117	2.45	51.1	206.4	
39 (2011)	Ross	23,500	1.34	2.806	1.74	46.2	344.4	+ 8.8 %
39 (2010)	Ross	22,700	5.74	2.789	1.84	45.1	316.8	
18 (2011)	Ross	18,000	2.29	2.579	2.02	47.08	265	--
18 (2010)	--	--	--	--	--	--	--	
19 (2011)	Ross	18,000	2.30	2.466	2.18	45.85	241	--
19 (2010)	--	--	--	--	--	--	--	
BUILDING	BREED	TOTAL NUMBER OF BIRDS	CORRECTED MORTALITY %		CORRECTED FCR		CORRECTED EPEF	
2011 	Ross	229,000	2.24		2.042		257	
2010 (+3P)	Ross	182,700	7.47		2.098		259	

GROWTH PERIOD	NUMBER OF BIRDS	MORTALITY	FINAL WEIGHT	FCR	SLAUGHTER AGE	EPEF
1		%	Kg		DAYS	
2010 (+3P)	178,000	6.21	3.021	2.131	51.15	260
2011 	183,600	4.11	2.717	2.051	50.17	253

GROWTH PERIOD	NUMBER OF BIRDS	MORTALITY	FINAL WEIGHT	FCR	SLAUGHTER AGE	EPEF
2		%	Kg		DAYS	
2010 (+3P)	163,350	4.86	3.004	2.24	51.98	246
2011 	227,000	2.72	2.720	1.97	47.2	285

GROWTH PERIOD	NUMBER OF BIRDS	MORTALITY	FINAL WEIGHT	FCR	SLAUGHTER AGE	EPEF
3		%	Kg		DAYS	
2010 (+3P)	182,700	7.47	2.893	2.098	49.21	259
2011 	229,000	2.24	2.633	2.042	49.07	257

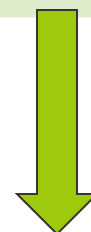
GROWTH PERIODS 1+2+3	NUMBER OF BIRDS	MORTALITY %	FINAL WEIGHT Kg	FCR	SLAUGHTER AGE DAYS	EPEF
2010 (+3P) 2011 	524,050 639,600	6.23 2.95 (-52.7 %)	2.971 2.688	2.154 2.019 (-6.3 %)	50.73 48.72	255 265 (+4.1 %)



+21,177 birds X 2,688
Kg = 56,923 Kg x 1.35 €
= **76,846 €**



- 471 MT feed X
320 € = **150,720 €**



A COST BENEFIT ANALYSIS WITH USE OF ULTRAFED® BROILERS

	FARM	
Nr. of birds	639,600	
FCR	2.154 → 2.019 (-6.3%)	150,720 €
Mortality	6.23 → 2.95 (-52.7%)	76,846 €
Benefit from taking off 3 products	9.74 €/MT feed X 3,471 MT feed = 33,807 €	
Total benefit	261,373 €	
Cost of ULTRAFED® BROILERS	3 kg X 3,471 MT X 2.45 € = 25,512 €	
Net benefit per bird	0,36 €	

Broiler Trial 3/ Ultrafed Broilers (gen.4): Large Integrator Turkey



Ranking of Turkish broiler Integrators (results 2012)

- 1- Banvit 190,000 MT meat / 120 million birds / year
- 2- Er Pilic 175,000 MT meat
- 3- Bey pilic 170,000 MT meat
- 4- Sen Pilic
- 5- CP Pilic
- 6- Abalioglu-Lezita
- 7- Keskinoglu
- 8- Sekker
- 9- Gedik
- 10-Modurnu 50,000 MT meat
- 11-Bupilic 45,000 MT meat / 32 million birds / year

Current mortalities are : 7-10 %

The total Turkish market counts: 1,6 million MT meat / >1 billion birds / year

Use of PRIMAFED® in Turkish integrator-TR

- Installation in the area of Bandırma
- Use of PRIMAFED® in all placements of 42nd week of 2012 and comparison with results of placements of weeks 41 and 43
- Use of PRIMAFED® : 2,5 Kg / MT feed
- The registration of the product in the Turkish ministry (2011) was made with the original name of the product



In November 2012 Geohellas SA launched a global name Ultrafed® / for all species Pigs, Broilers, Layers, Dairy



47.HAFTA PERFORMANS DEĞERLERİ

Sıra No:	Adı Soyadı	Kesim Tarihi	Kesim Haftası	Giren Cıvıv Adedi	İmha Yüzdesi	Ölüm Oranı	Toplam Canlı Ağırlık	Ortalama Canlı Ağırlık	FCR	Kesim Yaşı	Ortalama Ver. Katsayısı	Günlük Gramaj
1	HASAN ÇETİN	19.11.2012	47	110.880	0,65	5,12	249.340	2,386	1,729	41,80	313,183	0,057
2	AHMET ÇELİK	21.11.2012	47	33.988	0,88	6,20	71.940	2,277	1,685	40,69	311,439	0,056
3	AHMET YOLGİDEN	24.11.2012	47	15.000	0,17	6,61	33.240	2,377	1,751	40,92	309,858	0,058
4	SEBAHATTİN SALAM-2	24.11.2012	47	24.052		4,08	56.720	2,459	1,769	43,06	309,621	0,057
5	HAYDAR FİLİZ	25.11.2012	47	39.512		8,29	84.100	2,321	1,805	39,61	297,695	0,059
6	BAHAR ÇETİN	19.11.2012	47	27.912		5,07	60.140	2,270	1,822	41,71	283,541	0,054
7	MELİHA ÖZ-1	24.11.2012	47	14.835	0,67	7,05	29.880	2,182	1,809	40,14	279,294	0,054
8	EMİNE DEMİR	24.11.2012	47	37.434	0,02	7,51	74.600	2,155	1,788	39,96	278,955	0,054
9	HAYRİYE ŞAFAK	20.11.2012	47	20.300	0,39	12,88	38.000	2,157	1,720	39,22	278,592	0,055
10	HASAN YÜKSEL UZUN	22.11.2012	47	42.032	0,90	10,41	76.040	2,038	1,755	38,30	271,572	0,053
11	MELEK ERCAN	22.11.2012	47	16.952	0,74	7,89	33.740	2,177	1,823	40,63	270,699	0,054
12	ALİ ERYILMAZ	25.11.2012	47	26.205	0,38	12,02	53.220	2,317	1,798	42,12	269,209	0,055
13	AHMET ERYILMAZ	22.11.2012	47	25.015	0,40	8,97	47.640	2,101	1,774	40,56	265,750	0,052
14	TURGUT İLHAN	20.11.2012	47	70.940	0,42	11,44	126.300	2,019	1,821	37,31	263,084	0,054
15	ERTUĞRUL SAVAŞ	22.11.2012	47	26.305	0,24	8,32	53.940	2,242	1,901	41,89	258,052	0,054
16	ÖZLEM ÇAĞAN	21.11.2012	47	36.005	0,58	12,58	70.000	2,237	1,872	40,50	257,978	0,055
17	MELİHA ÖZ-2	20.11.2012	47	23.116	0,52	9,53	47.860	2,300	2,013	41,59	248,545	0,055
18	KEMAL ALTINER	20.11.2012	47	28.945	1,31	10,64	50.340	1,972	1,870	38,16	247,021	0,052
19	FEDAİ TAVŞAN	19.11.2012	47	53.882	0,91	7,75	81.340	1,651	1,781	35,41	241,586	0,047
20	HATİCE HAYIRLI	20.11.2012	47	11.993	0,75	8,31	23.280	2,133	1,965	42,46	234,389	0,050
	TOPLAM DEĞERLER			685.303	0,52	8,36	1.361.660	2,180	1,796	40,80	278,124	0,054

PRİMAFED KATKILI KÜMESLERE AİT PERFORMANS DEĞERLERİ

Sıra No:	Adı Soyadı	Kesim Tarihi	Kesim Haftası	Giren Cıvıv Adedi	İmha Yüzdesi	Ölüm Oranı	Toplam Canlı Ağırlık	Ortalama Canlı Ağırlık	FCR	Kesim Yaşı	Ortalama Ver. Katsayısı	Gün. Gr. Artışı
1	SERKAN SAK	28.11.2012	48	26.907	0,58	3,76	62.500	2,428	1,702	41,09	334,044	0,059
2	AYTAV LTD.ŞTİ-GÖRÜKLE	25.11.2012	47	18.950	1,06	7,15	44.640	2,564	1,761	41,00	329,709	0,063
3	ZEYNEP ÇOLAKOĞLU	03.12.2012	49	21.515		4,91	52.180	2,550	1,773	41,54	329,378	0,061
4	AHMET KUNDAKÇI	29.11.2012	48	23.060		6,30	49.960	2,312	1,688	39,30	326,596	0,059
5	İSMAİL GÜLEN	02.12.2012	48	20.632		6,33	47.220	2,443	1,741	40,38	325,614	0,061
6	AYŞE KOÇ	27.11.2012	48	41.647	0,91	4,90	97.840	2,493	1,797	40,60	324,878	0,061
7	AYŞE ÇETİN	27.11.2012	48	22.555		5,44	49.920	2,341	1,751	39,40	320,880	0,059
8	MAHİR KIRTAŞ	29.11.2012	48	25.020		3,25	54.660	2,258	1,723	39,59	320,298	0,057
9	NURULLAH SEVMİŞ	28.11.2012	48	21.260	1,88	6,19	45.200	2,310	1,680	40,40	319,256	0,057
10	CEVAT BAŞKILIÇ	26.11.2012	48	23.508	0,85	6,00	51.160	2,335	1,751	39,47	317,673	0,059
11	ALİ OSMAN KÖSE	01.12.2012	48	17.430		3,16	39.920	2,365	1,784	40,91	313,888	0,058
12	İSHAK ŞAHİNBOLAT	01.12.2012	48	38.940	0,93	5,85	82.100	2,260	1,694	40,31	311,737	0,056
13	ALİ SÖNMEZ	26.11.2012	48	26.561	1,32	5,09	56.020	2,252	1,724	39,97	310,093	0,056
14	RECEP DEMİR	28.11.2012	48	36.980	0,27	6,44	80.140	2,322	1,800	39,33	306,988	0,059
15	CELAL BAŞKILIÇ	26.11.2012	48	24.245		5,51	49.740	2,171	1,734	39,58	298,885	0,055
16	AYŞE OKLU	02.12.2012	48	33.170		3,14	74.860	2,330	1,823	42,05	294,360	0,055
17	İSA GÜNDOĞDU	29.11.2012	48	30.720		4,88	64.560	2,209	1,820	39,86	289,732	0,055
18	AHMET İNCE	01.12.2012	48	27.300		5,28	57.720	2,232	1,861	40,47	280,719	0,055
19	COŞKUN AKSOY	29.11.2012	48	29.855	0,70	4,75	58.000	2,054	1,917	37,82	269,823	0,054
20	İSMET AYER	26.11.2012	48	27.934	1,25	13,49	49.420	2,071	1,777	38,19	263,949	0,054
21	ABDULLAH GÖKÇE	29.11.2012	48	19.465		11,73	35.060	2,041	1,797	38,91	257,563	0,052
	TOPLAM DEĞERLER			557.654	0,49	5,79	1.202.820	2,301	1,769	40,02	306,177	0,057

49.HAFTA PERFORMANS DEĞERLERİ

Sıra No:	Adı Soyadı	Kesim Tarihi	Kesim Haftası	Giren Cıvıv Adedi	İmha Yüzdesi	Ölüm Oranı	Toplam Canlı Ağırlık	Ortalama Canlı Ağırlık	FCR	Kesim Yaşı	Ortalama Ver.Katsayısı	Günlük Gramaj
1	ALİ MEHMET DENİZ	09.12.2012	49	11.993		3,63	28.000	2,423	1,629	40,87	350,617	0,059
2	DURMUŞ ALİ DURMUŞ	05.12.2012	49	16.996		4,99	37.020	2,293	1,642	39,00	340,062	0,059
3	MUZAFFER ER	04.12.2012	49	36.570		4,95	87.000	2,503	1,718	42,00	329,682	0,060
4	AYHAN ÖZDEMİR	09.12.2012	49	15.992		5,08	36.560	2,408	1,694	40,93	329,661	0,059
5	RAHİM YILMAZ	06.12.2012	49	44.990		7,13	87.860	2,103	1,683	37,94	305,930	0,055
6	BURHAN SEVİNÇ	03.12.2012	49	33.985	0,12	8,22	70.560	2,265	1,716	39,85	303,913	0,057
7	RECEP KARANFİL	09.12.2012	49	7.520		4,23	15.280	2,122	1,731	39,00	300,981	0,054
8	İDRİS ALTINTAŞ-3	03.12.2012	49	38.060	2,10	8,81	73.320	2,158	1,693	39,07	297,401	0,055
9	METE ARS	04.12.2012	49	18.615	1,38	8,32	35.300	2,097	1,734	37,32	297,067	0,056
10	HİDAYET GÜLEÇ	09.12.2012	49	13.415	0,75	6,17	28.300	2,265	1,751	41,03	295,846	0,055
11	MUHAMMED SÖNMEZ-2	09.12.2012	49	35.965	2,22	8,51	75.560	2,349	1,799	40,96	291,573	0,057
12	AYHAN UYSAL	05.12.2012	49	12.480	0,40	7,00	25.820	2,234	1,735	41,07	291,441	0,054
13	NERMİN TABAK	08.12.2012	49	40.000	0,75	5,89	81.920	2,193	1,755	41,11	286,016	0,053
14	ABDULAZİM USLU	08.12.2012	49	21.275	0,47	8,54	44.580	2,302	1,827	40,77	282,576	0,056
15	YUSUF İNCE	04.12.2012	49	36.950	0,54	10,59	64.860	1,974	1,719	36,66	280,112	0,054
16	MUHAMMED SÖNMEZ-1	06.12.2012	49	19.838	0,76	7,68	37.500	2,063	1,772	38,54	278,897	0,054
17	İSMAİL YILMAZ-1	06.12.2012	49	19.989		8,69	38.120	2,089	1,786	38,93	274,237	0,054
18	KEMAL ÖĞÜT	05.12.2012	49	22.990	2,17	9,43	43.920	2,156	1,815	40,46	265,978	0,053
19	MEHMET UYSAL	05.12.2012	49	12.480	0,40	7,32	24.280	2,108	1,820	41,06	261,334	0,051
20	SAMET KAYALI	08.12.2012	49	18.000	0,63	7,68	35.900	2,174	1,897	40,63	260,434	0,054
21	İSMAİL YILMAZ-2	06.12.2012	49	22.483		9,98	40.080	1,980	1,836	38,62	251,459	0,051
TOPLAM DEĞERLER				500.586	0,69	7,57	1.011.740	2,202	1,745	39,70	293,711	0,055

EVALUATION OF PRIMAFED PERFORMANCE

December 08, 2012

No	PRODUCER Name Last Name	Slaughter Date	Slaughter Week	Initial Number of Broilers	Number of Destroyed Broilers	Destroy %	Accepted Number of Broilers	Number of Slaughtere d Broilers	Mortality	Mortality %	Total Live Weight	Average Live Weight	Total Amount of Consumed Feed	FCR	Salughter Age	EPEF	DWG g
1	SERKAN SAK	28/11/2012	48	26.907	157	0,58	26.750	25744	1.006	3,76	62.500	2,428	106.400	1,702	41,09	334,044	0,059
2	AYTAV LTD.ŞTİ- GÖRÜKLE	25/11/2012	47	18.950	200	1,06	18.750	17410	1.340	7,15	44.640	2,564	78.620	1,761	41,00	329,709	0,063
3	ZEYNEP ÇOLAKOĞLU	3/12/2012	49	21.515			21.515	20459	1.056	4,91	52.180	2,550	92.500	1,773	41,54	329,378	0,061
4	AHMET KUNDAKÇI	29/11/2012	48	23.060			23.060	21608	1.452	6,30	49.960	2,312	84.320	1,688	39,30	326,596	0,059
5	İSMAİL GÜLEN	2/12/2012	48	20.632			20.632	19326	1.306	6,33	47.220	2,443	82.200	1,741	40,38	325,614	0,061
6	AYŞE KOÇ	27/11/2012	48	41.647	380	0,91	41.267	39245	2.022	4,90	97.840	2,493	175.860	1,797	40,60	324,878	0,061
7	AYŞE ÇETİN	27/11/2012	48	22.555			22.555	21327	1.228	5,44	49.920	2,341	87.390	1,751	39,40	320,880	0,059
8	MAHİR KIRTAŞ	29/11/2012	48	25.020			25.020	24208	812	3,25	54.660	2,258	94.160	1,723	39,59	320,298	0,057
9	NURULLAH SEVMİŞ	28/11/2012	48	21.260	400	1,88	20.860	19568	1.292	6,19	45.200	2,310	75.940	1,680	40,40	319,256	0,057
10	CEVAT BAŞKILIÇ	26/11/2012	48	23.508	200	0,85	23.308	21909	1.399	6,00	51.160	2,335	89.560	1,751	39,47	317,673	0,059
11	ALİ OSMAN KÖSE	1/12/2012	48	17.430			17.430	16880	550	3,16	39.920	2,365	71.200	1,784	40,91	313,888	0,058
12	İSHAK ŞAHİNBO LAT	1/12/2012	48	38.940	363	0,93	38.577	36322	2.255	5,85	82.100	2,260	139.060	1,694	40,31	311,737	0,056
13	ALİ SÖNMEZ	26/11/2012	48	26.561	350	1,32	26.211	24878	1.333	5,09	56.020	2,252	96.590	1,724	39,97	310,093	0,056
14	RECEP DEMİR	28/11/2012	48	36.980	100	0,27	36.880	34506	2.374	6,44	80.140	2,322	144.220	1,800	39,33	306,988	0,059
15	CELAL BAŞKILIÇ	26/11/2012	48	24.245			24.245	22909	1.336	5,51	49.740	2,171	86.260	1,734	39,58	298,885	0,055
16	AYŞE OKLU	2/12/2012	48	33.170			33.170	32128	1.042	3,14	74.860	2,330	136.500	1,823	42,05	294,360	0,055
17	İSA GÜNDOĞDU	29/11/2012	48	30.720			30.720	29221	1.499	4,88	64.560	2,209	117.470	1,820	39,86	289,732	0,055
18	AHMET İNCE	1/12/2012	48	27.300			27.300	25858	1.442	5,28	57.720	2,232	107.430	1,861	40,47	280,719	0,055
19	COŞKUN AKSOY	29/11/2012	48	29.855	210	0,70	29.645	28238	1.407	4,75	58.000	2,054	111.200	1,917	37,82	269,823	0,054
20	İSMET AYER	26/11/2012	48	27.934	350	1,25	27.584	23864	3.720	13,49	49.420	2,071	87.830	1,777	38,19	263,949	0,054
21	ABDULLAH GÖKÇE	29/11/2012	48	19.465			19.465	17182	2.283	11,73	35.060	2,041	63.020	1,797	38,91	257,563	0,052
	TOTAL NUMBERS			557.654	2.710	0,49	554.944	522.790	32.154	5,79	1.202.820	2,301	2.127.730	1,769	40,02	306,177	0,057

TURKISH INTEGRATOR BROILER PERFORMANCE WITHOUT / WITH ULTRAFED® BROILERS

WEEK OF PLACEMENT / No OF BIRDS	SLAUGHTER WEEK 2012	MORTALITY %	TOTAL WEIGHT Kg	FINAL BODY WEIGHT Kg	FCR	SLAUGHTER AGE days	EPEF	DWG g
WEEK 41 685.303	47	8,36	1.361.660	2,180	1,796	40,00	278,124	0,054
WEEK 42 557.654 	48	5,79	1.202.820	2,301	1,769	40,02	306,177	0,057
WEEK 43 500.586	49	7,57	1.011.740	2,202	1,745	39,70	293,711	0,055

(100 – MORTALITY%) X FINAL BODY WEIGHT (Kg) X 100 / FCR

* EPEF = -----

SLAUGHTER AGE (Days)



GEOHELLAS

EPEF : European Production Efficiency Factor



- Higher intestinal hygiene
- Reduction of diarrheas (wet droppings)
- Improved status of bedding material
- Reduction of breast blisters and hock burns
- Improve meat quality (reduction of hematomas)
- Reduction of mortality
- Better Feed valorization (FCR)
- Considerable economic benefit of the farm (improved EPEF)
- Improved egg laying percentage

Broilers Trial 4/ Ultrafed Premium (published work papers 1,2,3):Vet school (gen.4)



bigdutchman.com

Broilers and Ultrafed (Body weight / Mortality)

- Ultrafed® Premium at 3 kg/tn



	Dietary treatment		
Parameters	Control	Ultrafed Premium ¹	<i>P</i> - value
Bodyweight			
14 d	252	272	0.155
28 d	1512	1566	0.145
35 d	2005	2105	0.075
44 d	2355 ^b	2550 ^a	0.042
Mortality	3.62 ^a	3.01 ^b	0.005

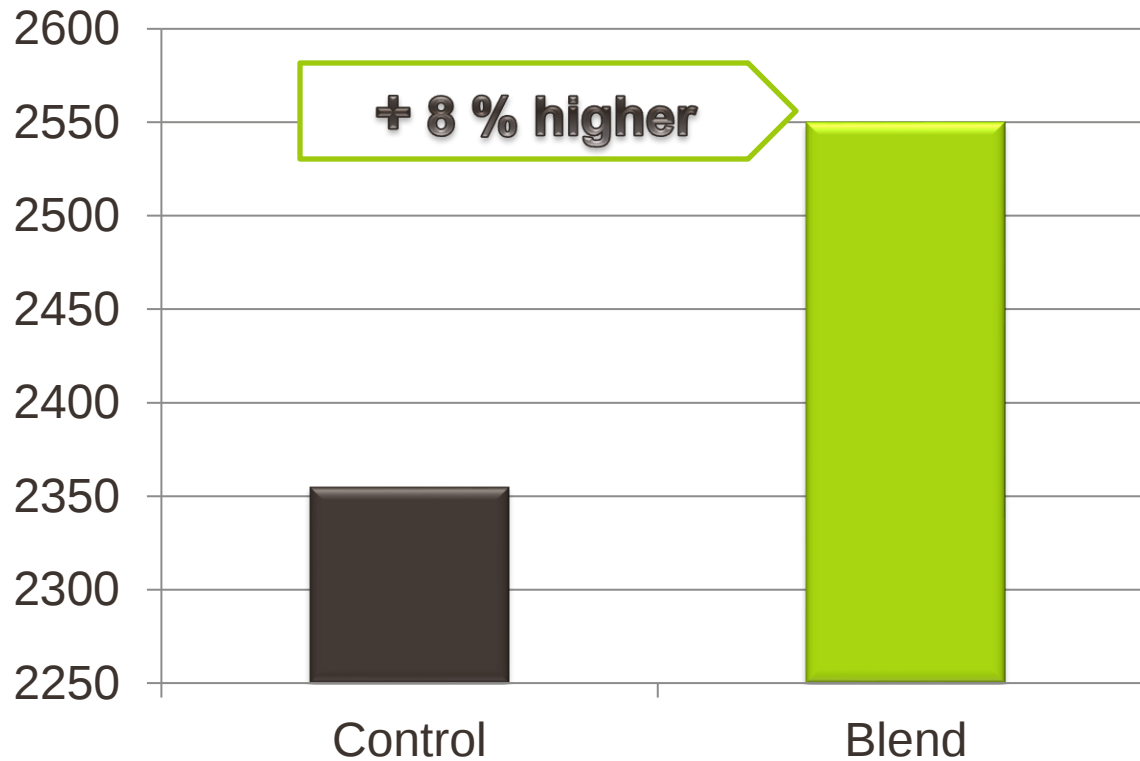
(Skoufos et .2016)

^{a,b} Mean values within a row with superscripts differ significantly at $P < 0.05$.

¹ Blend represents group of birds fed the basal diet supplemented with 5 % oregano essential oil at a level of 30 mg/kg and attapulgit at 3000 mg/kg of diet, respectively

Broilers and Ultrafed Body weight

44 days



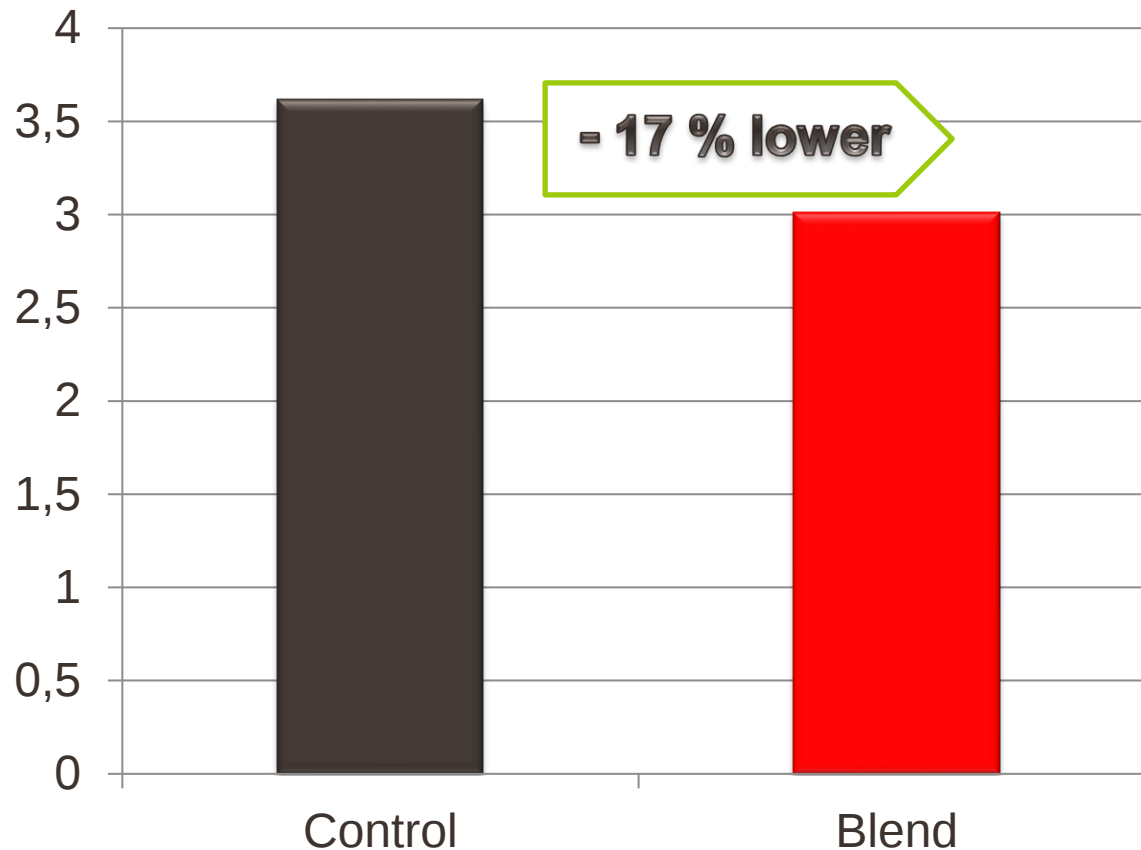
ULTRAFED
PREMIUM

NEW special formula
with essential oils



en.aviagen.com

Broilers and Ultrafed Mortality



20.000 birds and 3.62% mortality equals to 724 lost birds

20.000 birds and 3.01% mortality equals to 602 lost birds.

122 birds difference

Broilers and Ultrafed FCR



Item	Dietary treatment		
	Control	Blend ¹	<i>P</i> - value
FCR, kg / kg			
14 d	1.11	1.06	0.244
28 d	1.46	1.41	0.252
35 d	1.55 ^a	1.46 ^b	0.005
44 d	1.81 ^a	1.70 ^b	0.004

(Skoufos et .2016)

^{a,b} Mean values within a row with superscripts differ significantly at $P < 0.05$.

¹ Blend represents group of birds fed the basal diet supplemented with 5 % oregano essential oil at a level of 30 mg/kg and attapulgate at 3000 mg/kg of diet, respectively

Broilers and Ultrafed FCR



ULTRAFED[®]
PREMIUM



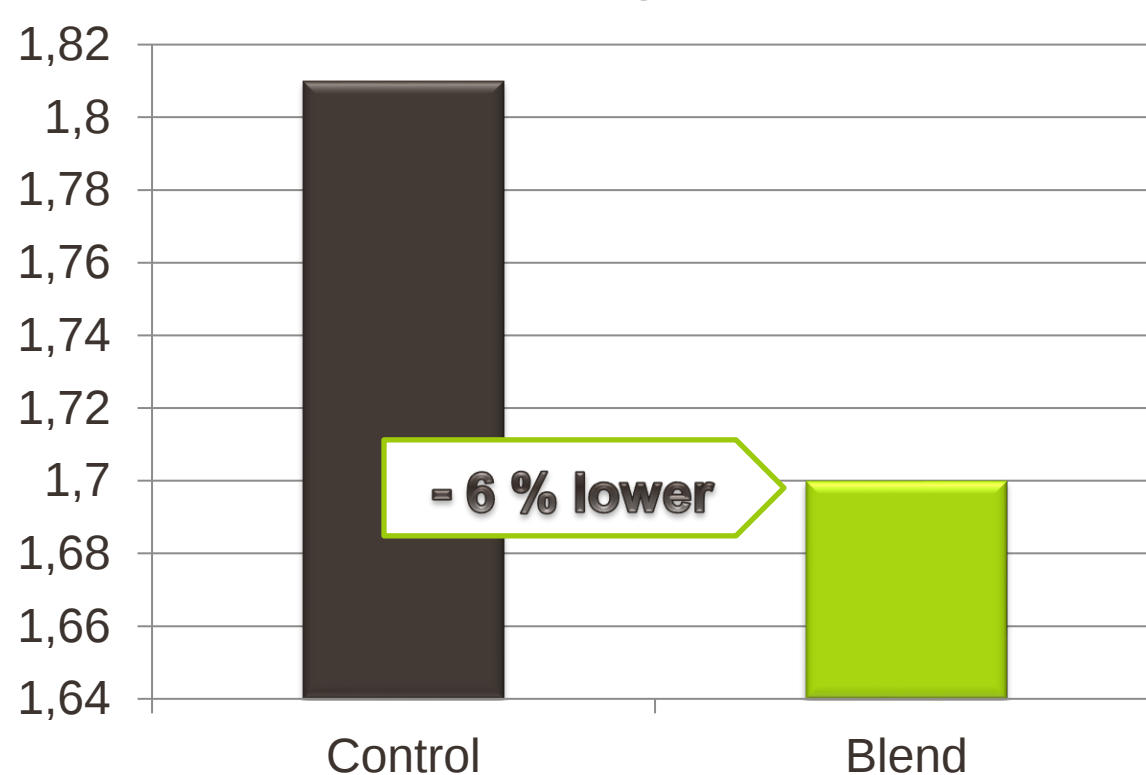
NEW special formula
with essential oils

20.000 birds and 1.81
FCR and 2,35kg final
weight, need of
85,07MT feed

20.000 birds and 1.70
FCR and 2,35kg final
weight, need of
79,90MT feed

**5.17 MT feed
difference**

44 days



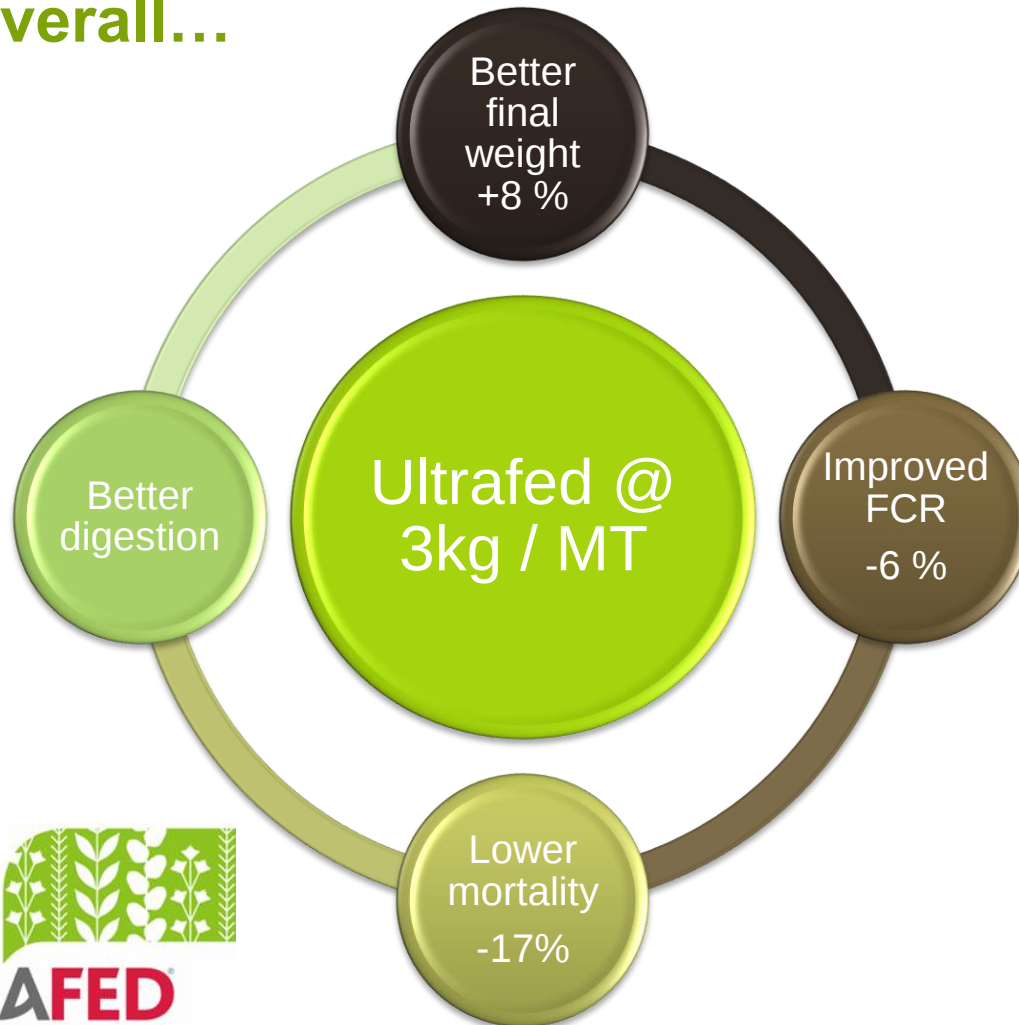
Broilers and Ultrafed



Parameters	3 Kg Ultrafed Premium/MT feed
Body weight	Significant
Mortality	Significant
FCR	Significant
pH	NS

Broilers and Ultrafed

Overall...



ULTRAFED
PREMIUM



NEW special formula
with essential oils

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GEOHELLAS

Broilers and Ultrafed – Intestinal microbiota

Intestinal microbiota in the ileum and caecum of 44-day-old broiler chickens fed a high inclusion level of oregano essential oil (OEO) and a low level of Attapulgite.



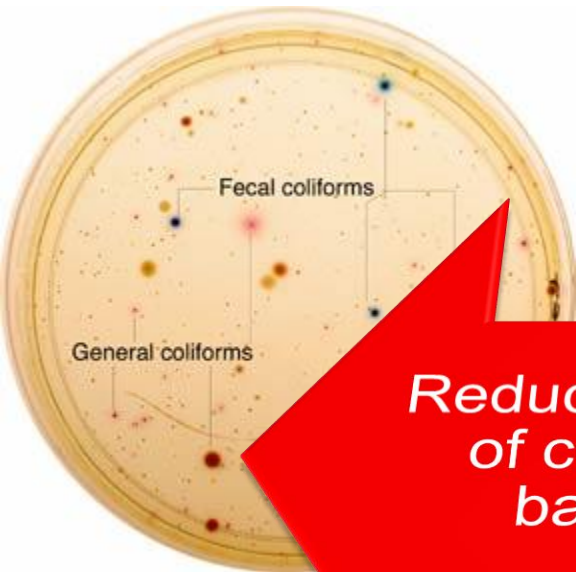
Parameters	Control	Blend
Ileum (cfu/g)		
Total aerobes	6.06×10^8	1.19×10^8
Total anaerobes	1.81×10^7	1.96×10^7
Total coliforms	2.91×10^{4a}	5.22×10^{2b}
<i>Lactobacilli</i> spp.	3.86×10^{6b}	2.88×10^{7a}
Caecum (cfu/g)		
Total aerobes	1.02×10^{6b}	1.28×10^8
Total anaerobes	5.20×10^7	4.37×10^8
Total coliforms	7.67×10^{7a}	2.67×10^{6b}
<i>Lactobacilli</i> spp.	5.55×10^{6b}	4.07×10^{7a}

^{a,b} Mean values within a row with superscripts differ significantly at $P < 0.05$.

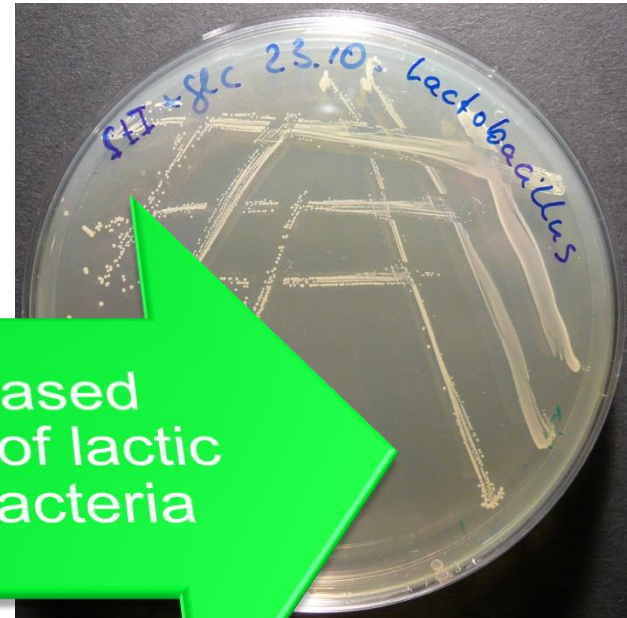
(Skoufos et al. 2016)

¹ Blend represents group of birds fed the basal diet supplemented with 5 % oregano essential oil at a level of 30 mg/kg and attapulgite at 3000 mg/kg of diet, respectively

Broilers and Ultrafed – Intestinal microbiota



**Reduced counts
of coliforms
bacteria**



**Increased
counts of lactic
acid bacteria**

Broilers Trial 5/ Sanfed Ultra & Sanfed Ultra Premium (gen.2) (published work paper): Central Luzon State University Philippines

Methodology

Experimental Treatments



Treatments	Contents	Inclusion Rate
Control (Basal Diet)	Contains corn with aflatoxin (172 ppb) and T2 toxin (151 ppb)	-
Basal Diet + Attapulgate regular (AR)	Sanfed Ultra	1kg/ton
Basal Diet + Attapulgate plus (AP)	Sanfed Ultra Premium	1kg/ton
Basal Diet + Hydrated sodium calcium aluminosilicate (HC)	Purified hydrated sodium calcium aluminosilicate (HSCAS)	1kg/ton
Basal Diet + HC Plus (HB)	HSCAS, vitamin C, calcium propionate	1kg/ton
Basal Diet + Bentonite Plus (BP)	Bentonite, diatomaceous earth, <i>Saccharomyces cerevisiae</i> , <i>Eubacterium</i> sp, enzyme, PhycoPhytic substance	1kg/ton

Broilers Performance

Body weight, WG, FCR

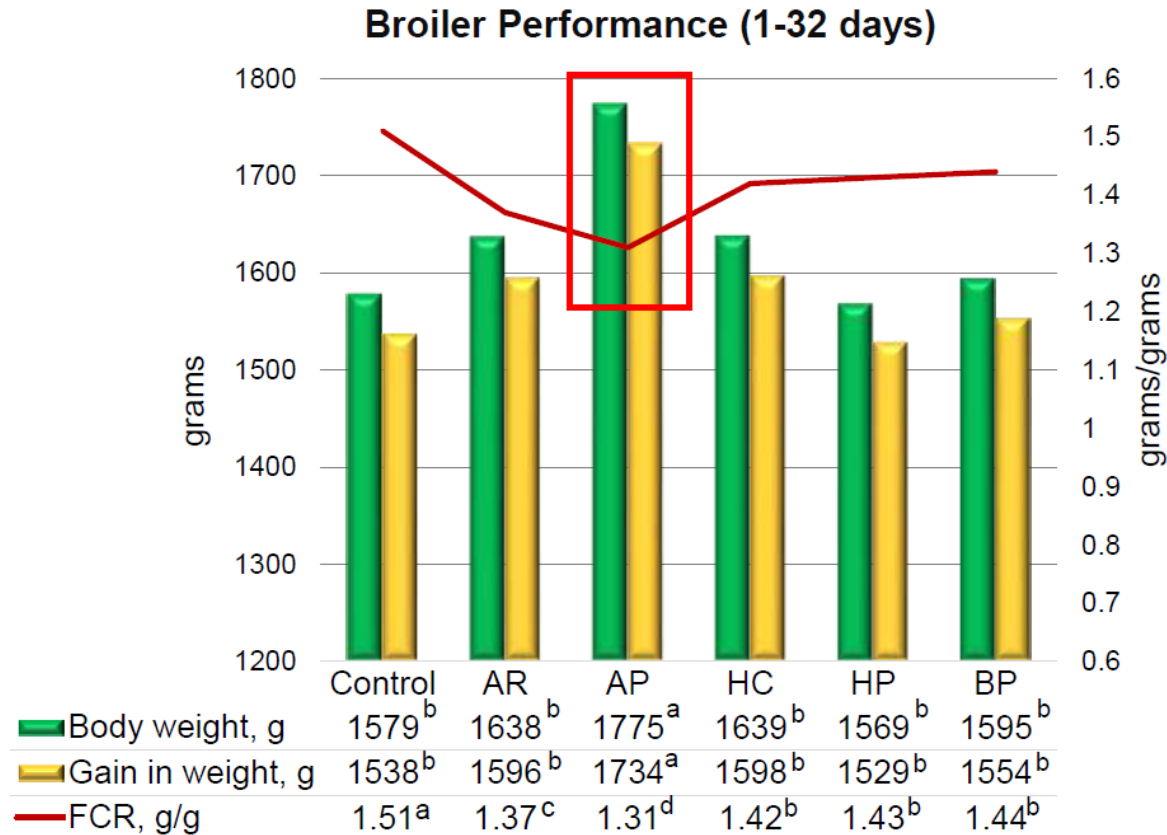


Figure 3. Production performance (1-32 days) of broilers fed diet contaminated with aflatoxin and T2 toxin added with different mycotoxin binders

AR: SANFED ULTRA

AP: SANFED ULTRA PREMIUM



Broilers Performance

Mortality

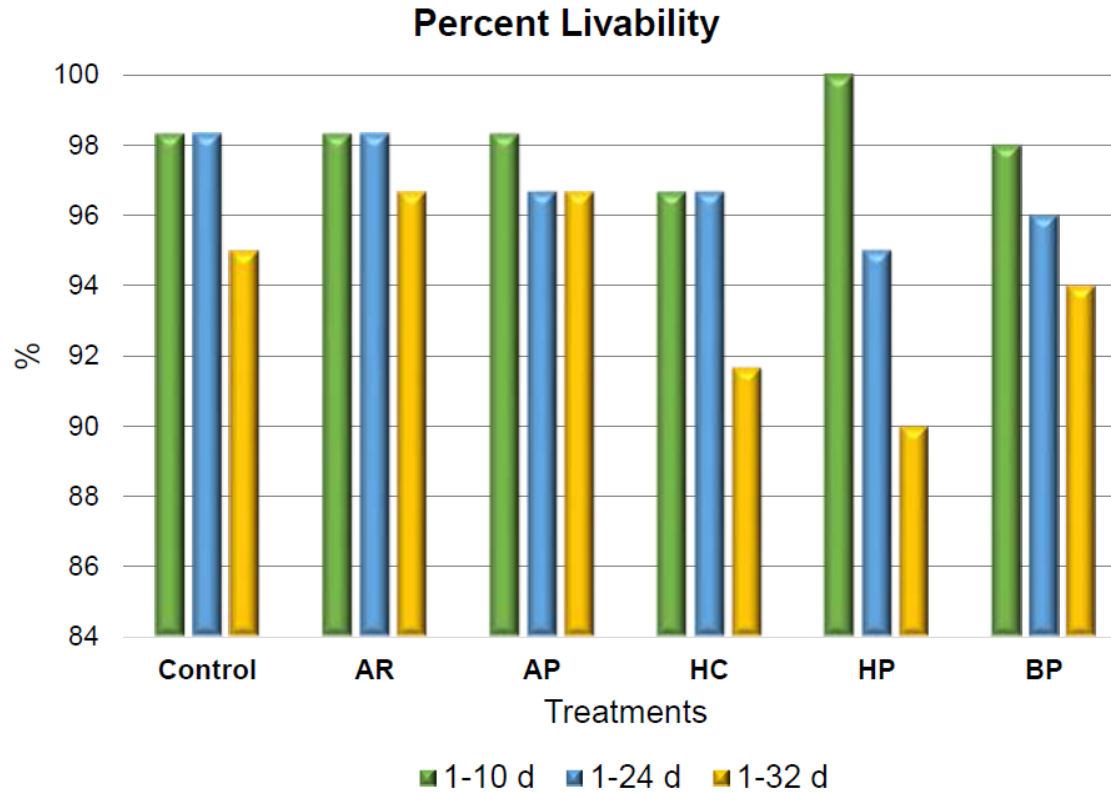


Figure 4. Percent livability of broilers fed diet contaminated with aflatoxin and T2 toxin added with different mycotoxin binders

AR: SANFED ULTRA
AP: SANFED ULTRA PREMIUM



Broilers Performance

Liver status

Liver of Broilers Without and With Toxin Binder in their Diet

Control

Enlarged, pale and with blotchy lesion (Control)

AR

AP

HC

HP

BP

Dark brown and relatively uniform in color in broilers fed with mycotoxin and in reference group

AR: SANFED ULTRA

AP: SANFED ULTRA PREMIUM



Broilers Performance

Economic analysis

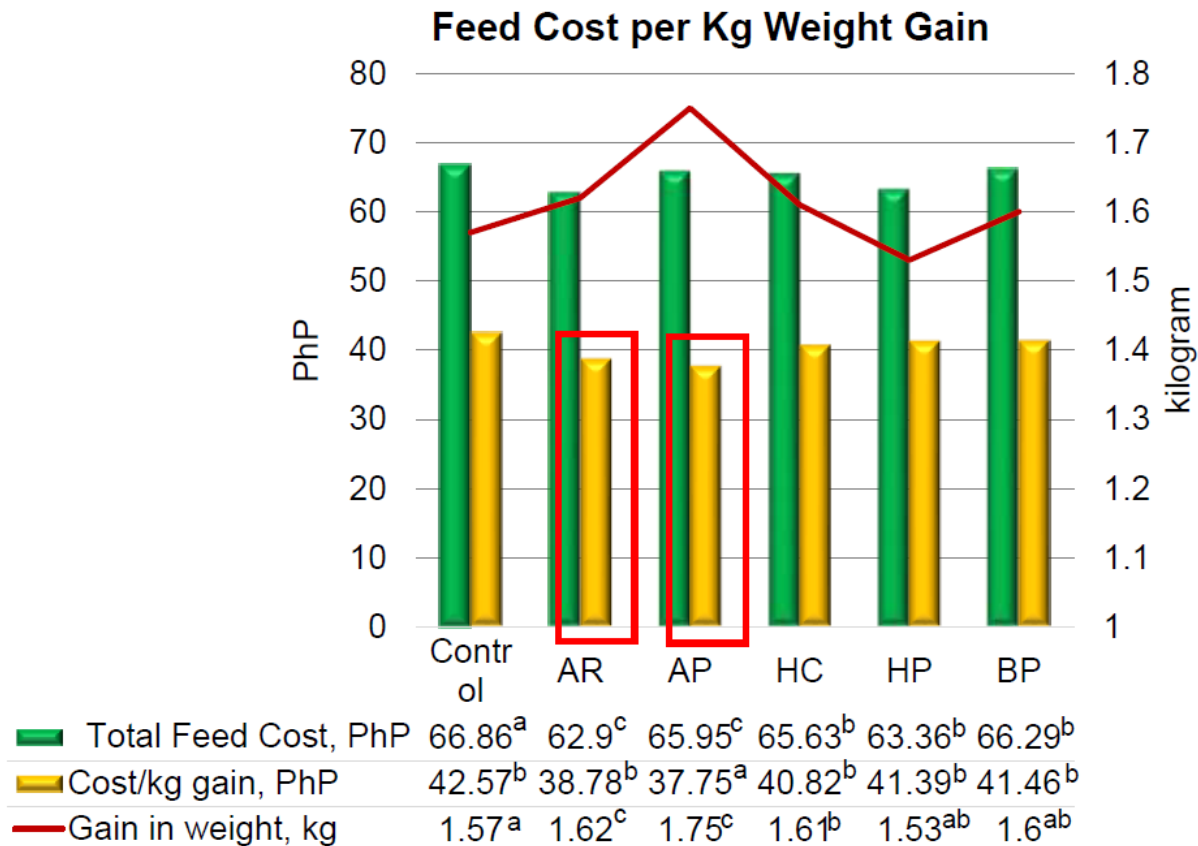


Figure 7. Feed cost per kg gain in bodyweight of broiler fed diet contaminated with aflatoxin and T2 toxin added with different mycotoxin binders

AR: SANFED ULTRA
AP: SANFED ULTRA PREMIUM



CONCLUSIONS

- Diet with **SANFED ULTRA PREMIUM** had the profoundest influence on alleviating the adverse effects of aflatoxin and T 2 on broiler performance diet with **SANFED ULTRA** was generally comparable with the diets containing either HC, HP or BP
- Some gross lesions possibly caused aflatoxin and T 2 toxin were minimized by the inclusion of any of the toxin binders
- Diet with **SANFED ULTRA PREMIUM** elicited the least feed cost per kilogram gain in broilers followed by the diet with **SANFED ULTRA**, compared with their counterparts



Layers Trial 1/ Sanfed Powder: AUA published work (gen.1)

SANFED[®]
Powder



Layers and Attapulgit – Performance characteristics

SANFED[®]
Powder

		Dietary treatment		
Parameters	Exp. period (weeks)	Control	Att. @ 1 %	P - value
Laying percentage	0 – 8	91.87	93.26	NS
	0 – 24	91.76 ^a	94.13 ^b	*
Feed intake (g)	0 – 8	115.75 ^a	114.94 ^a	***
	0 - 24	118.67	118.49	NS
FCR	0 – 8	2.23	2.14	NS
	0 - 24	2.17	2.07 ^b	*
Body Weight (kg)	0	1.53	1.58	NS
	8	1.84 ^a	1.81 ^a	***
	24	1.99	1.94	NS

NS: Not significant ($P > 0.10$)

* * $P < 0.05$.

*** $P < 0.001$.

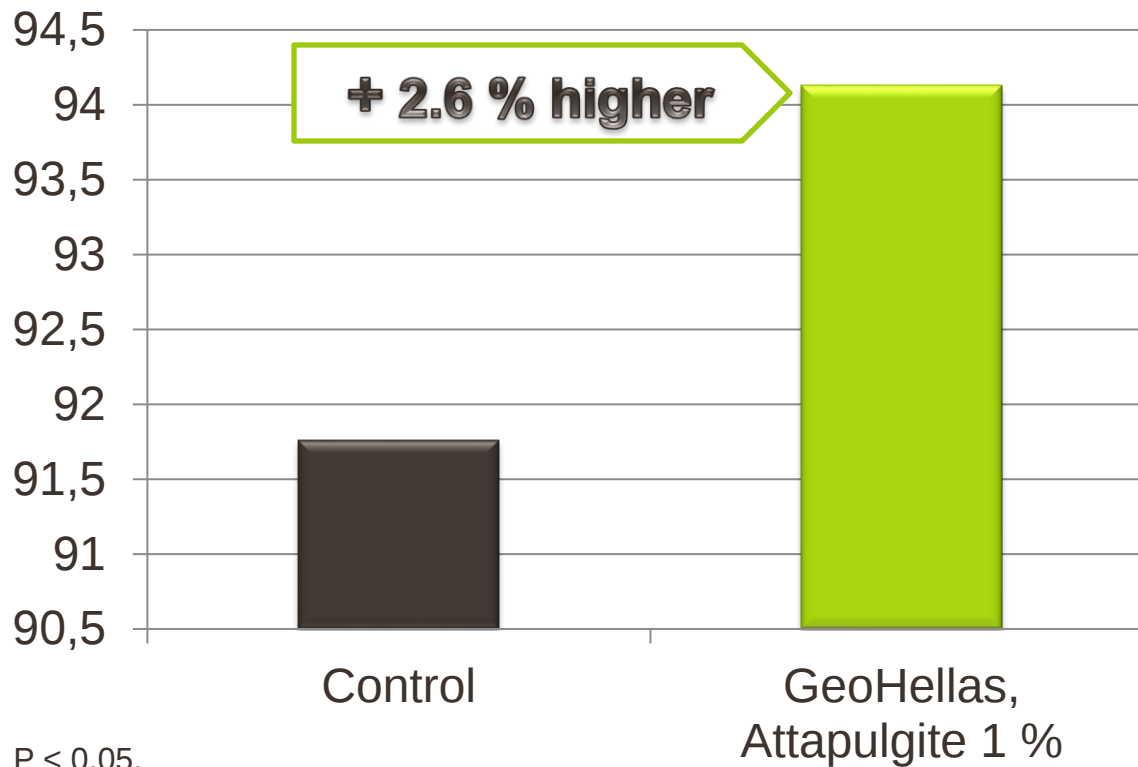
a, b : Values in the same row with no superscript in common differ significantly.

(Chalvatsi et al. 2014)

Layers and Attapulgit – Performance characteristics

SANFED[®]
Powder

Laying percentage 0 – 24 weeks

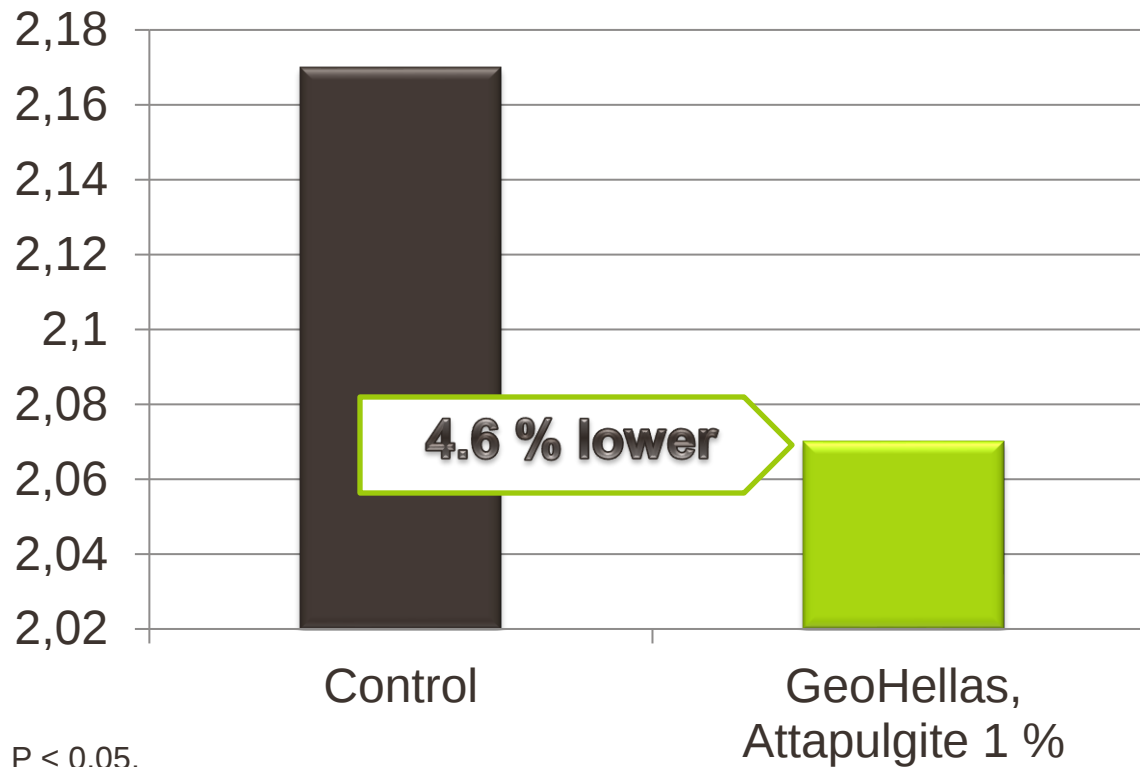


edmontonjournal.com

Layers and Attapulgit – Performance characteristics

SANFED[®]
Powder

FCR 0 – 24 weeks



cacklehatchery.com

Layers and Attapulgitte – Egg Quality Traits

Mean values of external egg quality traits according to groups of hens, over 8 and 24-week periods.

Parameters	Dietary treatment				
	Exp. period (weeks)	Control	Att. @ 1 %	Att. @ 10 %	P - value
Weight (g)	0 – 8	57.90	59.11	57.19	NS
	0 – 24	61.20	61.63		NS
Shape index	0 – 8	77.80	77.66	77.41	NS
	0 – 24	77.20	77.16		NS
Eggshell color	0 – 8	23.50 ^a	25.68 ^b	24.85 ^{ab}	**
	0 – 24	21.90 ^a	23.22 ^b		***
Specific gravity	0 – 8	1.090	1.092	1.091	NS
	0 – 24	1.091	1.091		NS
Eggshell weight (g)	0 – 8	5.65 ^a	5.95 ^b	5.69 ^a	**
	0 – 24	6.08	6.16		NS
Eggshell thickness (mm)	0 – 8	0.414 ^a	0.430 ^b	0.417 ^{ab}	*
	0 – 24	0.432 ^a	0.439 ^b		*

NS: Not significant ($P > 0.10$)

* $P < 0.05$.

** $P < 0.01$.

*** $P < 0.001$.

a, b : Values in the same row with no superscript in common differ significantly.

(Chalvatsi et al. 2014)

Layers and Attapulгите

SANFED[®] Powder

Parameters	Basal diet supplemented with 1 % Attapulгите, GeoHellas S.A.
Feed Consumption	NS
Body weight	NS
Laying percentage	2,60 % improvement
FCR	4,60 % improvement
Eggshell thickness	significantly higher

P < 0.05.

(Chalvatsi et al. 2014)

Layers Trial 2/ Sanfed Ultra: AUT Vet school published work (gen.2)



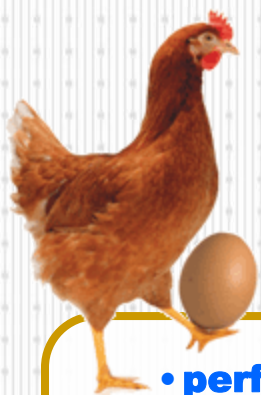
EFFECT OF SANFED ULTRA ON LAYING PULLETS PERFORMANCE

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Department of Animal Husbandry Ichthyology and Protection of the Environment, Faculty of Veterinary Medicine, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

SANFED[®]
ULTRA





• **performance characteristics and egg quality** of laying hens fed on diets containing attapulgite at safety (1%) and tolerance (9.1%) levels were assessed

Previous studies

Studies

Attapulgite (Sanfed Powder) inclusion at a level of 1% increased significantly laying percentage and improved feed conversion ratio

Attapulgite (Sanfed Powder) inclusion at a level of 9.1% (tolerance trial) did not affect negatively laying performance, health status or mortality

Attapulgite is a safe substance that can be used in the diet of laying hens to improve their performance

Studies



- performance characteristics and egg quality of laying hens fed on diets containing attapulgit at safety (1%) and tolerance (10%) levels

Previous study

- effect of Sanfed Ultra at a rate of 0,2 % on pullets growth and



This study

- on the subsequent laying performance was evaluated

Materials and methods

Birds

- 432 female day-old *Hyline brown* chicks
- Two groups with four replicate per group (n=54)

Rearing system

- Deep litter floor with fresh wood-shavings as bedding material

Diets

- Two dietary treatments with 0 and 0,5% attapulgite respectively



Study period:
18 weeks



Materials and methods

Birds

- 432 female day-old *Hyline brown* chicks
- Two groups with four replicate per group (n=54)

Rearing system

- Deep litter floor with fresh wood-shavings as bedding material

Diets

- Two dietary treatments with 0 and 0,5% attapulgite respectively



**Study period:
18 weeks**

Materials and methods

Birds

- 432 female day-old *Hyline brown* chicks
- Two groups with four replicate per group (n=54)

Rearing system

- Deep litter floor with fresh wood-shavings as bedding material

Diets

- Two dietary treatments with 0 and 0,2% Sanfed Ultra respectively

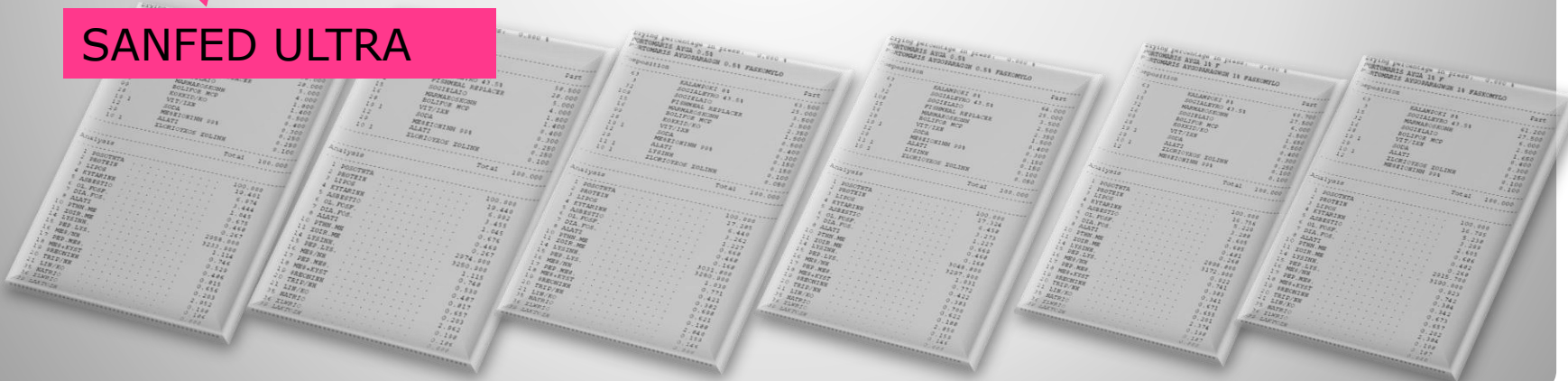


Study period:
18 weeks

Diets

Age	0-6 weeks		7-15 weeks		16-17 weeks	
Raw materials	Control	Attapulgit	Control	Attapulgit	Control	Attapulgit
Corn	585	583	640	638	612	610
Soyameal	280	280	250	250	275	275
SoyaRepl	50	50	35	35	0	0
Soya oil	40	40	25	25	25	25
Limestone	18	18	23.5	23.5	60	60
Monocal Phosphate	14	14	15	15	16.5	16.5
Vit. Premix	4	4	4	4	4	4
Sodium Carbonate	3	3	3	3	3	3
Methionine	2.5	2.5	1.5	1.5	1	1
Lysine	0	0	1	1	0	0
Salt	2.5	2.5	1.5	1.5	2.5	2.5
Choline Cl	1	1	0.5	0.5	1	1
Sanfed Ultra	0	2	0	2	0	2
Total	1000	1000	1000	1000	1000	1000

SANFED ULTRA



Measurements



Feed consumption
Feed conversion ratio

Body weight
Body weight uniformity

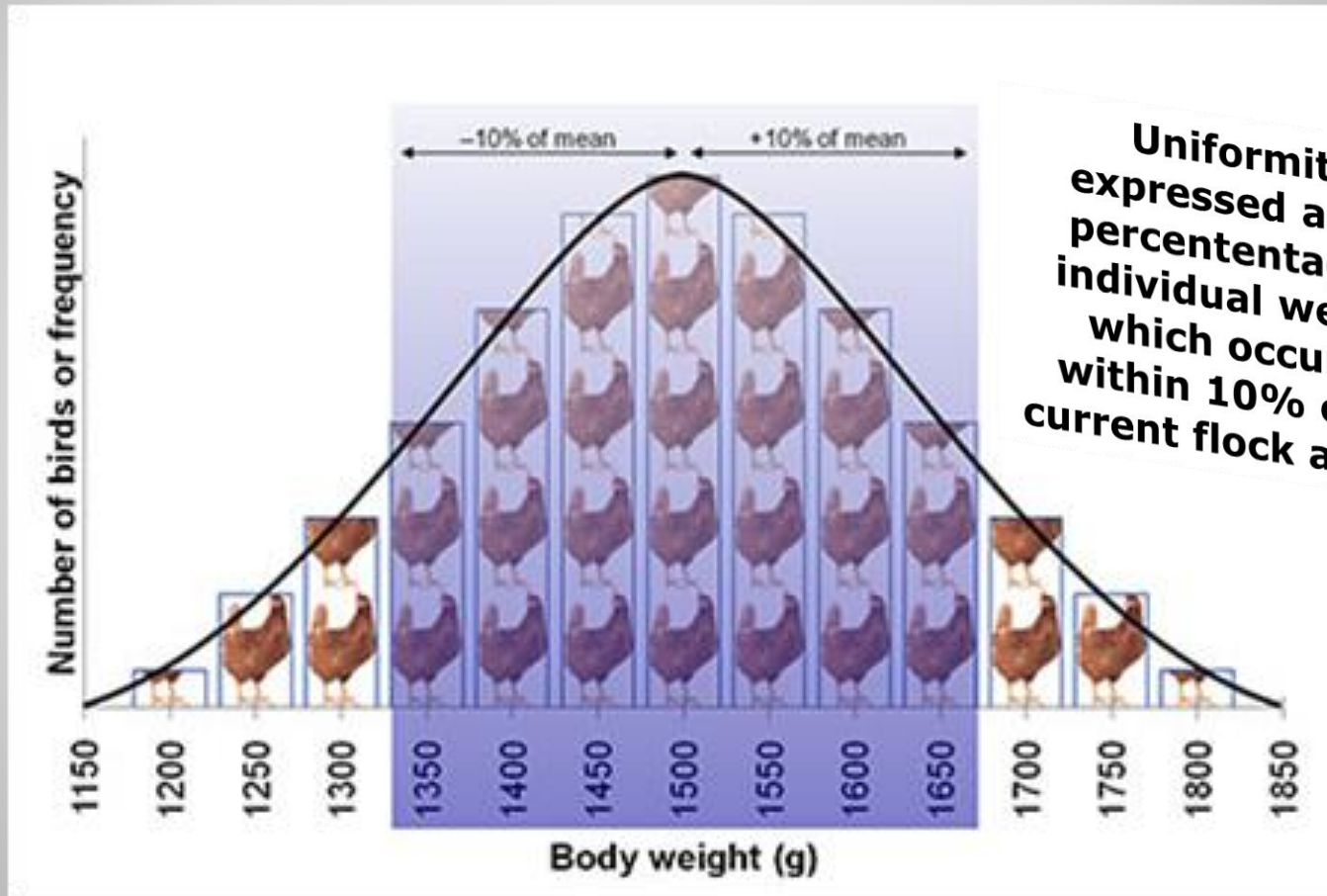
Mortality

Bone quality

Intestinal morphology
Gastrointestinal tract organs
measurements



Flock uniformity



RESULTS

Table 1. Effect of Sanfed Ultra supplementation on feed intake and feed conversion ratio (values are means $\pm$ SD)

Parameter	Level of attapulgit incorporation		Effect ¹
	0%	0.2%	
Feed intake (g)			
0-6 weeks	26.6 ± 9.68	27.0 ± 9.04	NS ¹
7-15 weeks	56.1 ± 12.83	57.1 ± 14.25	NS
16-18 weeks	81.7 ± 9.15	81.3 ± 6.18	NS
Feed conversion ratio			
0-18 weeks	5.6 ± 2.85	5.5 ± 2.31	NS

¹Effect: NS=not significant

RESULTS

Figure 1. The effect of Sanfed Ultra supplementation on body weight

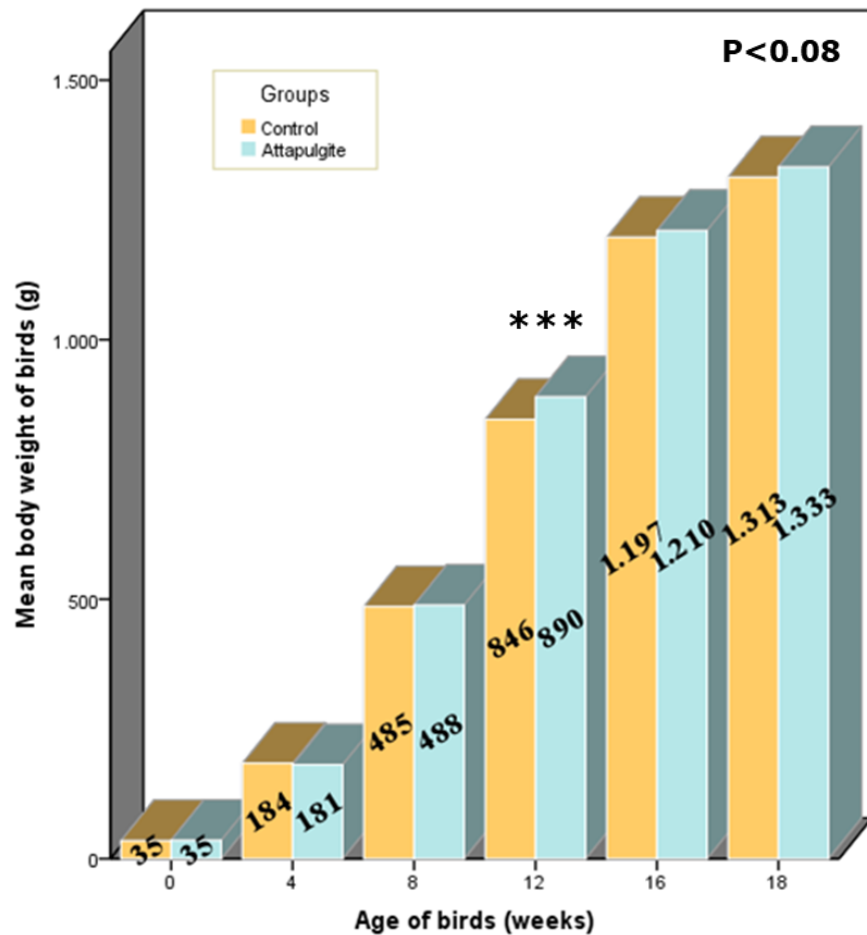
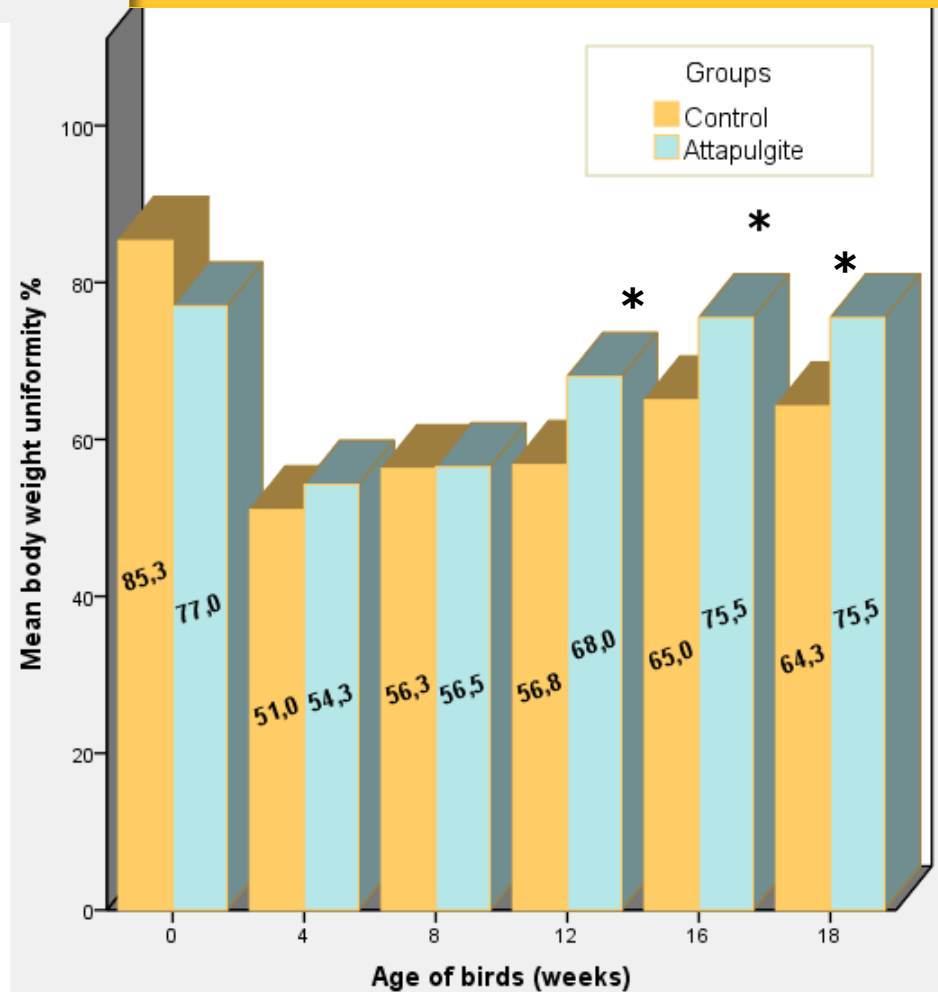


Figure 2. The effect of Sanfed Ultra supplementation on body weight uniformity



Mucosal Height in Duodenum (TM Height in pixels)



TM villi Height	Control	Sanfed Ultra
Duodenum	578.55	573.5
Jejunum	462.8	445.9
Ileum	326.15	338.5



Results

Better flock uniformity

Under the same rearing conditions, dietary treatment with attapulgit could have contributed to the better flock uniformity.

✓ Flock uniformity is an indicator of normal flock development.

✓ It is considered that flocks lacking uniformity at point of lay often exhibit lower and later peaks than expected.

LAYING PERIOD

Table 3. Mean egg laying percentage ($\pm$ SD) in experimental groups

Age of hens (weeks)	Groups			
	AA	AM	MM	MA
	(Growing/Laying)	(Growing/Laying)	(Growing/Laying)	(Growing/Laying)
22th-24th	24.42 $\pm$ 25.14 ^a	37.95 $\pm$ 29.48 ^{ab}	42.96 $\pm$ 28.79 ^b	44.26 $\pm$ 30.57 ^b
25th-45th	92.59 $\pm$ 9.74 ^a	91.25 $\pm$ 11.23 ^a	90.57 $\pm$ 11.50 ^a	87.33 $\pm$ 13.26 ^b
46th-63th	90.52 $\pm$ 9.88 ^a	86.95 $\pm$ 12.82 ^b	87.81 $\pm$ 13.58 ^b	85.14 $\pm$ 15.87 ^b

^{a,b} Means with different superscripts differ significantly (P<0.001)

Table 4. Average egg weight (g) ($\pm$ SD) in experimental groups

Age of hens (weeks)	Groups			
	AA	AM	MM	MA
25 th -63 th	65.71 $\pm$ 3.38 ^a	65.17 $\pm$ 3.90 ^b	64.91 $\pm$ 4.26 ^{bc}	64.41 $\pm$ 4.16 ^c

^{a,b} Means with different superscripts differ significantly ($P < 0.001$)

Age of hens (weeks)	AA+MA	AM+MM
25 th -63 th	65.06 $\pm$ 3.84	65.04 $\pm$ 4.09

Table 5. Mean feed conversion ratio ($\pm$ SD) in experimental groups

Age of hens (weeks)	Groups			
	AA	AM	MM	MA
25 th -63 th	2.25 $\pm$ 0.39 ^a	2.43 $\pm$ 0.54 ^b	2.43 $\pm$ 0.66 ^b	2.50 $\pm$ 0.66 ^b

^{a,b} Means with different superscripts differ significantly ($P < 0.001$)

Age of hens (weeks)	AA+MA	AM+MM
25 th -63 th	2.37 $\pm$ 0.55 ^a	2.43 $\pm$ 0.60 ^b

^{a,b} Means with different superscripts differ significantly ($P < 0.05$)

Table 6. Mean daily feed consumption (g) ($\pm$ SD) in experimental groups

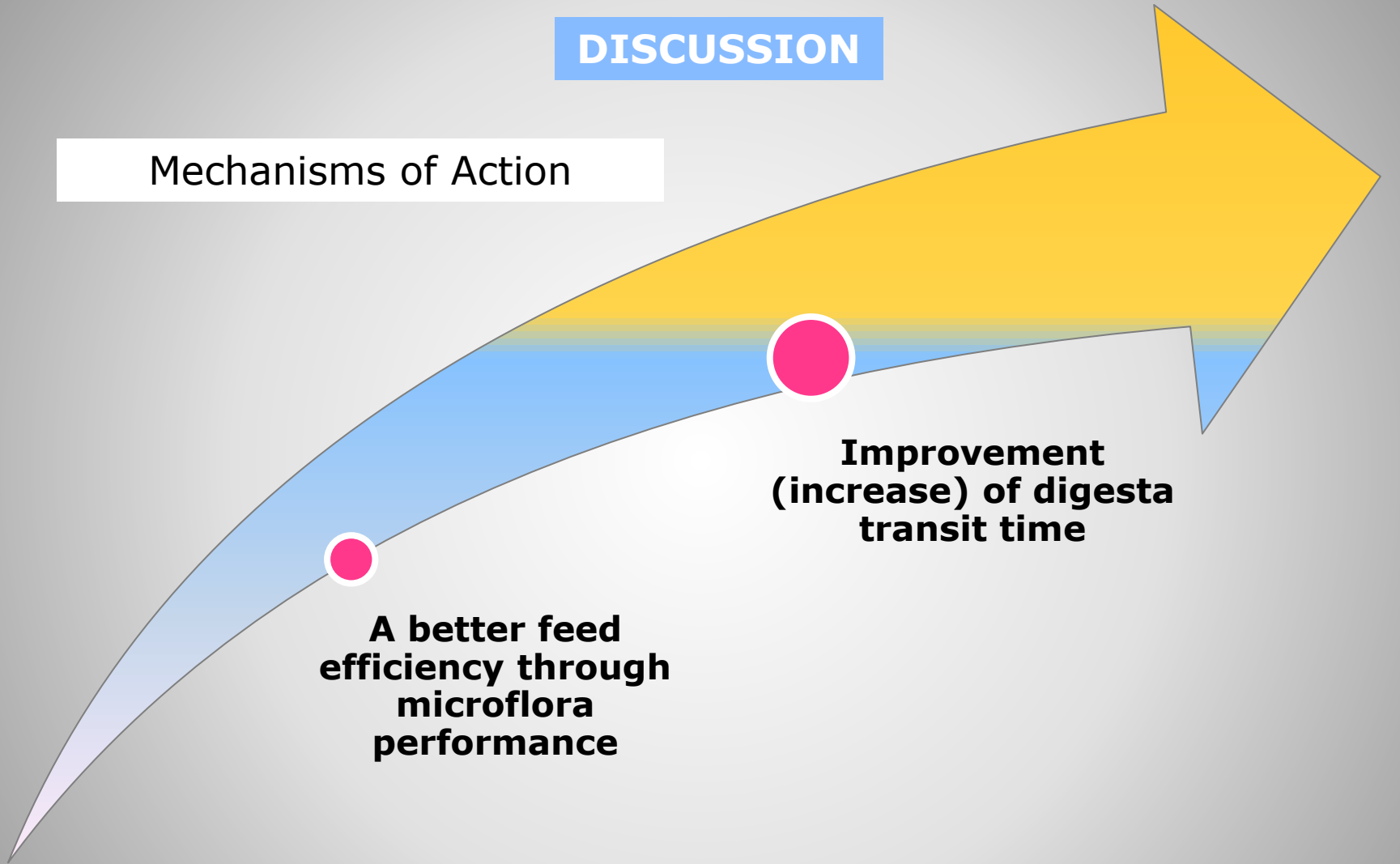
Age of hens (weeks)	Groups			
	AA	AM	MM	MA
19th-63th	129.36 $\pm$ 21.14 ^a	133.28 $\pm$ 21.15 ^{β}	131.84 $\pm$ 21.33 ^{aβ}	130.11 $\pm$ 21.80 ^a

Age of hens (weeks)	AA+MA	AM+MM
19th-63th	129.73 $\pm$ 21.47 ^a	132.57 $\pm$ 21.25 ^{β}

^{a,b} Means with different superscripts differ significantly ($P < 0.01$)

DISCUSSION

Mechanisms of Action



**A better feed
efficiency through
microflora
performance**

**Improvement
(increase) of digesta
transit time**

Digesta transit time study

- Incorporation of chromic oxide (Cr_2O_3) in laying hens diet as marker at a rate of 0,5%
- A 12 h feed withdrawal
- The time of first appearance of green coloured faeces was recorded



Faeces with marker



Faeces without marker

Transit time of digesta

Table 10. Average feed passage time (mins) ($\pm$ SD) in experimental groups

Age of hens (weeks)	Groups			
	AA	AM	MM	MA
56 th	196.08 $\pm$ 73.03	177.00 $\pm$ 56.56	160.92 $\pm$ 60.81	197.33 $\pm$ 67.95
63 th	198.08 $\pm$ 54.23	173.08 $\pm$ 68.11	167.92 $\pm$ 52.72	196.67 $\pm$ 40.36

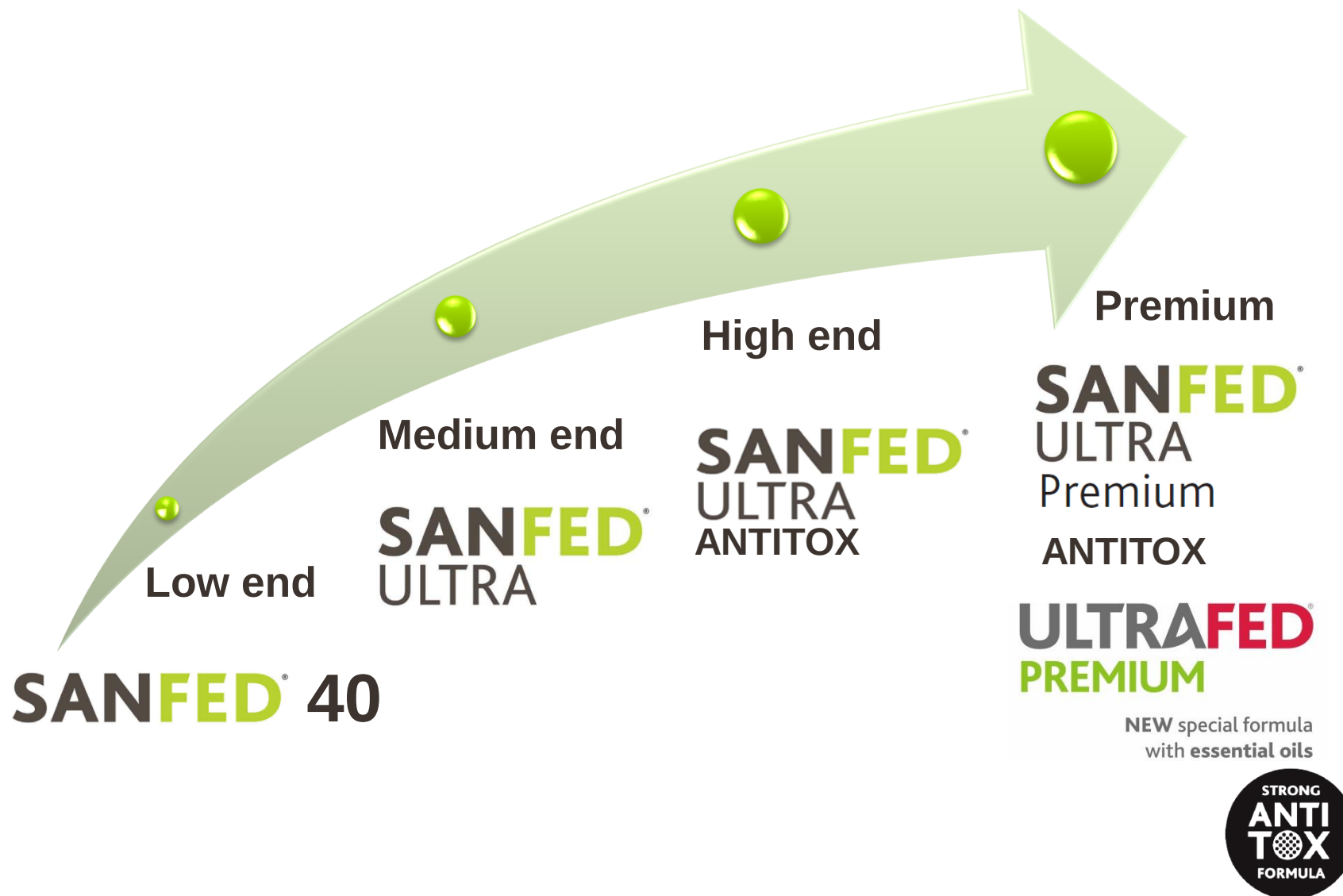
Age of hens (weeks)	AA+MA	AM+MM
56 th	196.71 $\pm$ 68.99	168.96 $\pm$ 58.02
63 th	197.38 $\pm$ 46.75*	170.50 $\pm$ 59.62*



Conclusion

- ✓ Beneficial effect of Sanfed Ultra on pullets growth, flock uniformity and on subsequent laying performance
- ✓ No adverse effects on bone structure and on intestinal morphology

Toxin binders GEOH : Four product generations



Broilers – Layers Toxin Binding Trial / Kleentox Advance: Vet School Budapest published (gen.4)

- **KleenTox® Advance:**

- mechanically/thermally activated micronized magnesium alumino-silicate clay,
- specific enzymes,
- selected plant extracts
- selected yeast cell wall

- KleenTox®Advance was used in artificial gastric Juice and artificial intestinal juice where added broiler and layer feed contaminated with mycotoxins.

Added Mycotoxin level:

Toxin	Broiler feed	Layer br. feed
DON ppb	2.000	500
FUM ppb	10.000	5000
OTA ppb	100	50
AF 1 ppb	100	50
T-2 ppb	500	200

The test incubation time is 0, 30, 60, 120, 240 and 300 minutes. Two pH value were tested, pH=4.5 and pH=7.5. each tested points were analyzed in three parallel analysis

Broilers – Layers Toxin Binding Trial / Kleentox Advance: Vet School Budapest published (gen.4)

1. There is a **synergetic action** between **the enzyme and mineral** component of the product.
2. The measurement of the adsorption in the first 30 minutes show that the **aflatoxin** concentration was **decreased by more than 95%**.
3. The summary of the mycotoxin elimination test in broiler and layer:

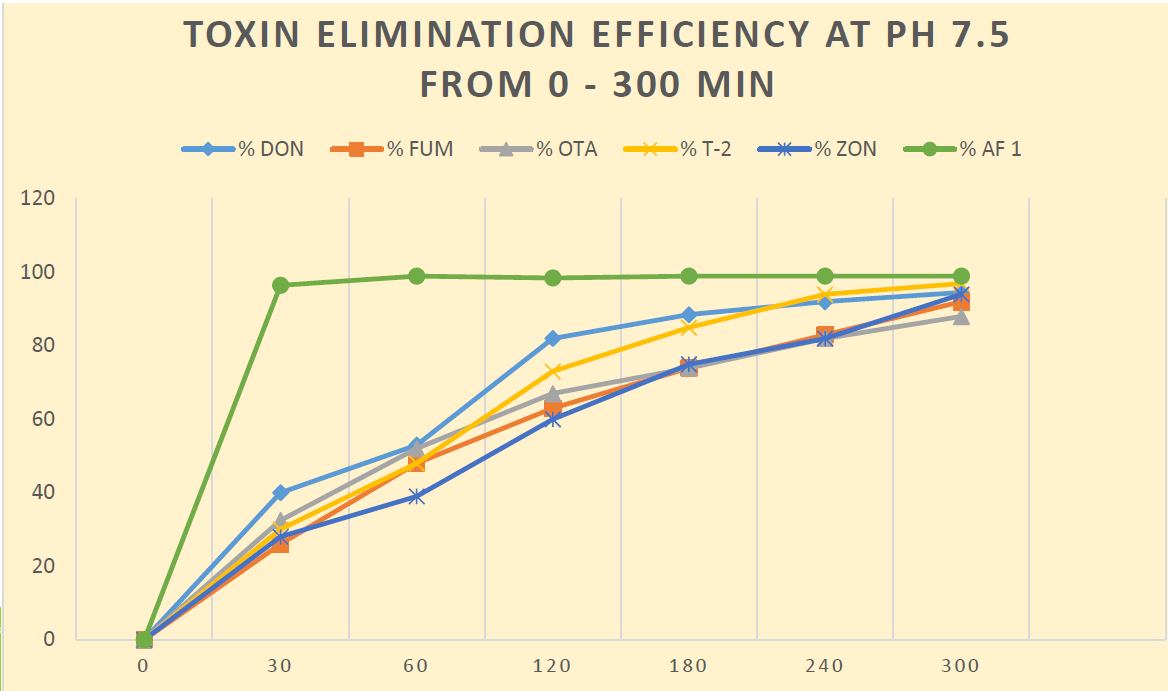
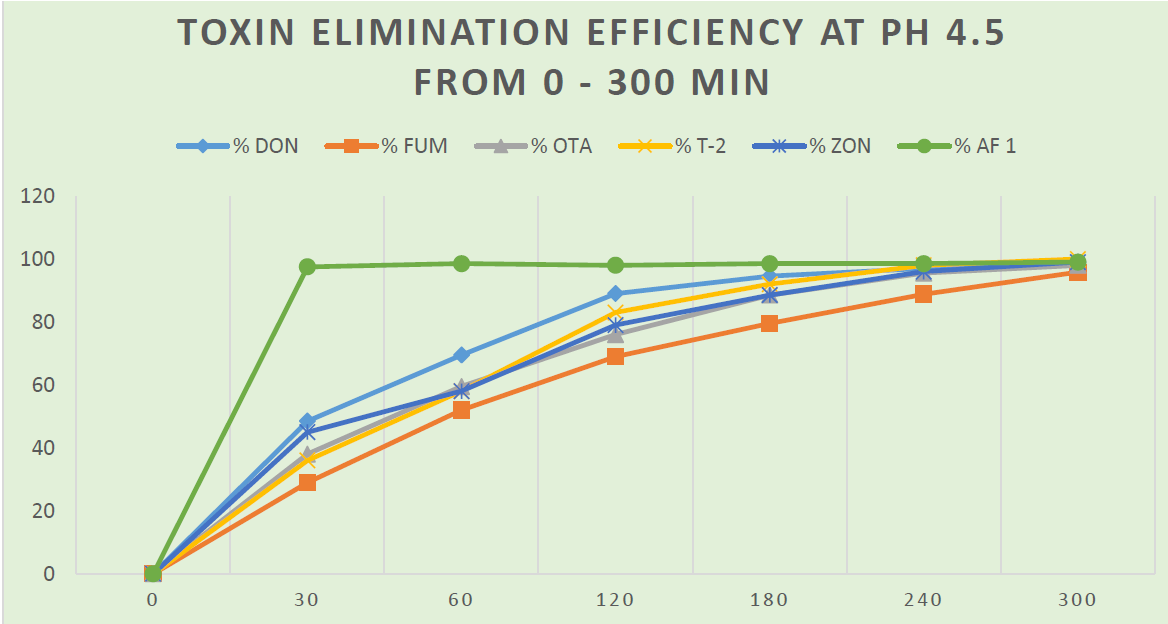
Broiler Feed

Mycotoxin	Elim. % pH 4.5	Elim. % pH 7.5
DON	99.0	94.5
FUM	95.8	92.0
OTA	98.0	88.0
T-2	100	98.0
ZON	98.0	94.0
AF 1	99.0	99.0

Layer Breeder Feed

Mycotoxin	Elim. % pH 4.5	Elim. % pH 7.5
DON	97.5	94.0
FUM	94.5	90.8
OTA	97.5	89.5
T-2	100	96.0
ZON	99.0	90.0
AF 1	99.0	99.0

Broiler Feed test results:



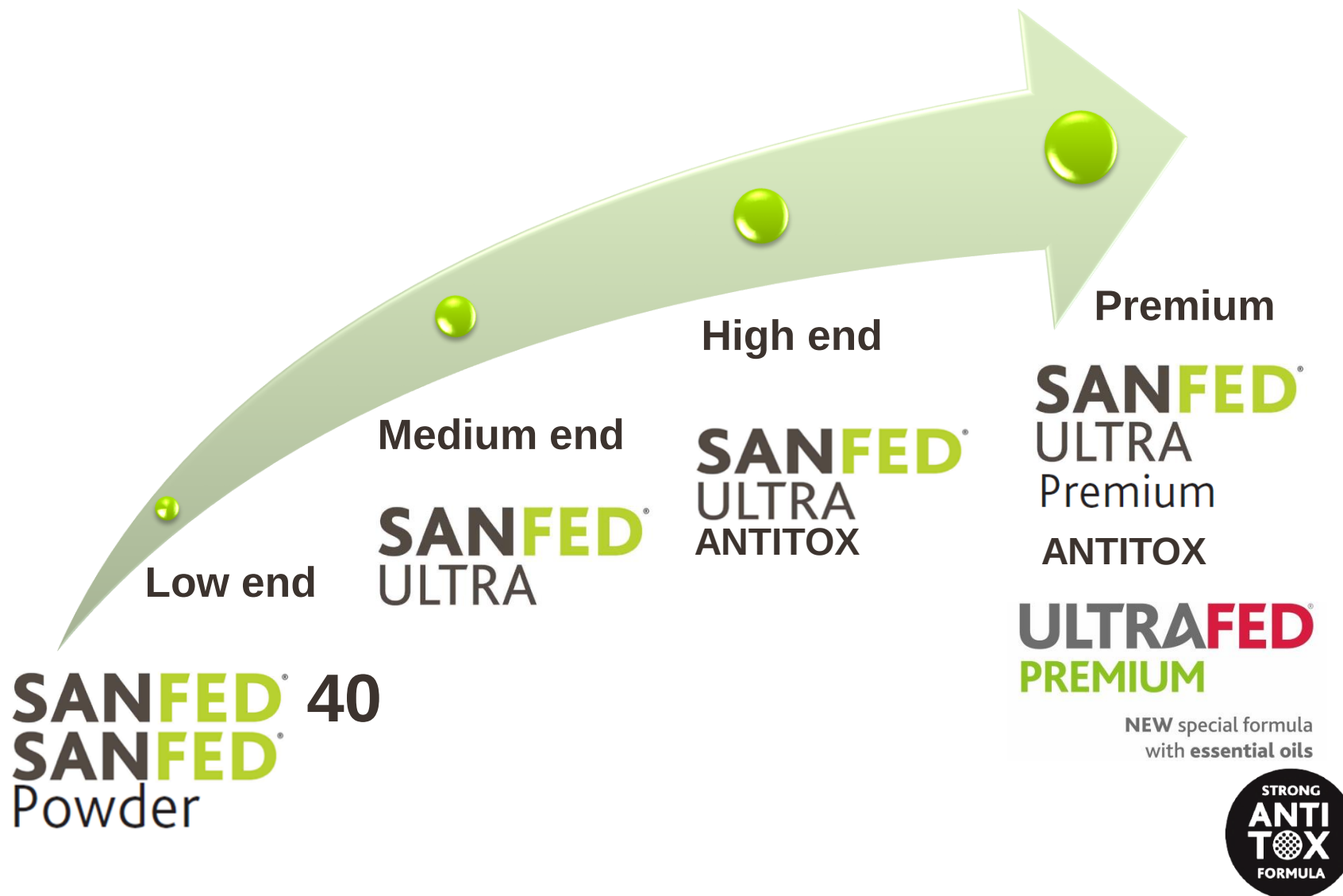
Ruminants

SANFED[®]
ULTRA



SANFED[®]
Powder

Toxin binders GEOH : Four product generations



Dairy Trial 1/ Sanfed Ultra: Field trial (integrator India) (gen.2)

BINSAR FARMS (binsarfarms.com)

- 60 dairy high yield cows per treatment (24.8 ltrs of milk / cow / day)
- Duration 30 days
- Start trial – on week 12 postpartum
- Dosage 30g / animal/ day
- External private accredited laboratory was used for the measurements for the milk samples

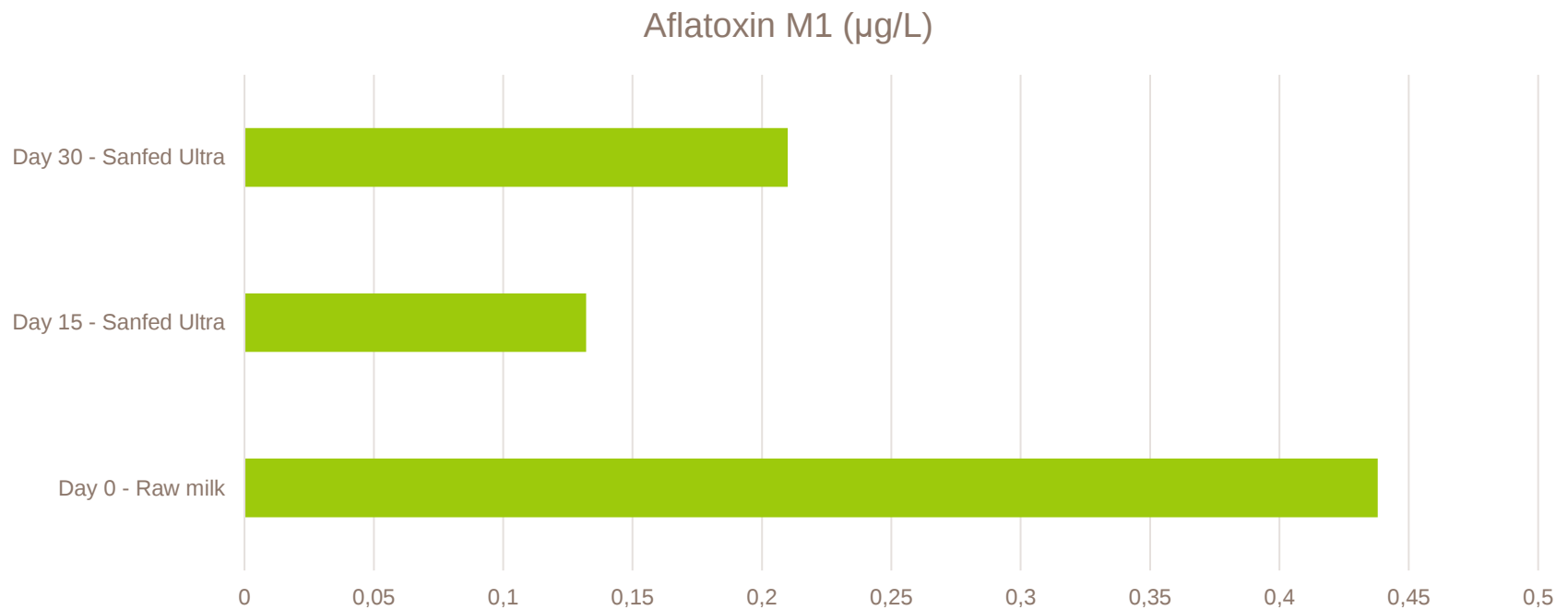
Diet schedule

SL. NO	INGREDIENTS	QTY(KG/COW/DAY)
1	PADDY STRAW	2.8
2	SOYA DOC	1.3
3	COTTON DOC	1.7
4	GRINDED CORN	2
5	RAPESEED DOC	0.4
6	BYPASS FAT	0.2
7	MOLASSES	1
8	RICEBRAN	0.75
9	DORB	0.75
10	GROUND NUT DOC	0.3
11	COTTON CAKE	0.2
12	WHOLE COTTON SEED	0.18
13	FULL FAT SOYA	0.8
14	BLACK LENTIL CHUNNI	1.2
15	SILAGE	19
16	PREMIX & ADDITIVES	0.75
	TOTAL QTY	33.33

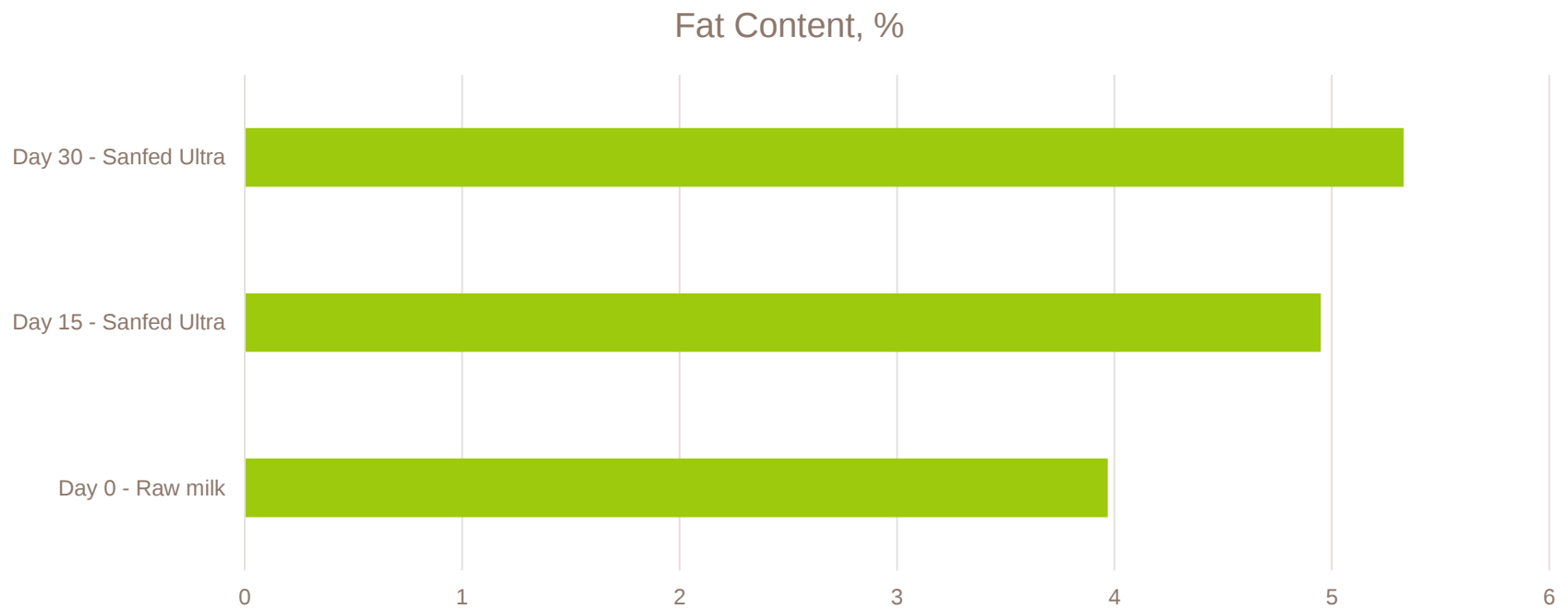
Sanfed Ultra - Trial - Results

Binsar Farms						
	Fat	Protein	Lactose	Total Solids	Somatic Cell	Aflatoxin M1
	(% m/v)	(% m/v)	(% m/v)	(% m/v)	(cell/ml)	(µg/L)
Day 0 - Raw milk	3,97	3,36	4,89	12,79	509000	0,438
Day 15 - Sanfed Ultra	4,95	3,36	4,82	13,68	473000	0,132
Day 30 – Sanfed Ultra	5,33	3,27	5,03	14,10	465000	0,210

Sanfed Ultra - Trial - Results



Sanfed Ultra - Trial - Results



DAY 0

Results of Component Section Tests

Batch ID / Submission form # **DABRY090519** Client: **[REDACTED]**
Type: **Casual Samples** Charge to: **[REDACTED]**
Authorised by: **[REDACTED]** Samples Received 09/05/2019
Report Date 09/05/2019

Comments

Customer	Sample	Lab ID	Fat	Protein	Lactose	Total Solids	Somatic Cell	Freezing Point	Freezing Point
Sample ID	Date		Mikroscan	Mikroscan	Mikroscan	Mikroscan	Count	Mikroscan	Cryoscope
			(% w/v)	(% w/v)	(% w/v)	(% w/v)	(Cells / mL)	(°C)	(°C)
			SOP 141	SOP 141	SOP 141	SOP 141	SOP 140-2	SOP 141	SOP 108
BINSAR RAW MILK	06/05/19	118	3.97	3.36	4.89	12.79	505000	-0.512	-0.519

Results Summary

Aflatoxin M1 in Milk

Laboratory ID	Sample ID	Aflatoxin M1
	Units	µg/L
	Reporting Limit	0.005
19-15580-1	Binsar Raw Milk	0.438

DAY 15

Results of Component Section Tests

Batch ID / Submission form # **BINSAR010619** Client: **[REDACTED]**
Type: **Casual Samples** Charge to: **[REDACTED]**
Authorised by: **[REDACTED]** Samples Received 01/06/2019
Report Date 01/06/2019

Comments
Lactosecan is not calibrated for pasteurised milk

Customer	Sample	Lab ID	Fat	Protein	Lactose	Total Solids	Somatic Cell	Freezing Point	Freezing Point
Sample ID	Date		Mikroscan	Mikroscan	Mikroscan	Mikroscan	Count	Mikroscan	Cryoscope
			(% w/v)	(% w/v)	(% w/v)	(% w/v)	(Cells / mL)	(°C)	(°C)
			SOP 141	SOP 141	SOP 141	SOP 141	SOP 140-2	SOP 141	SOP 108
BINSAR PASTES	28/05/19	901	4.18	3.45	4.90	13.10	317000	-0.524	-0.525
BINSAR A+	28/05/19	902	4.95	3.36	4.82	13.68	473000	-0.526	-0.525

Results Summary

Aflatoxin M1 in Milk

Laboratory ID	Sample ID	Aflatoxin M1
	Units	µg/L
	Reporting Limit	0.005
19-18780-1	Binsar Farms (901)	0.168
19-18780-2	Binsar A+ (902)	0.132

DAY 30

Results of Component Section Tests

Batch ID / Submission form # **DABRY010719** Client: **[REDACTED]**
Type: **Casual Samples** Charge to: **[REDACTED]**
Authorised by: **[REDACTED]** Samples Received 01/07/2019
Report Date 01/07/2019

Comments

Customer	Sample	Lab ID	Fat	Protein	Lactose	Total Solids	Somatic Cell	Freezing Point	Freezing Point
Sample ID	Date		Mikroscan	Mikroscan	Mikroscan	Mikroscan	Count	Mikroscan	Cryoscope
			(% w/v)	(% w/v)	(% w/v)	(% w/v)	(Cells / mL)	(°C)	(°C)
			SOP 141	SOP 141	SOP 141	SOP 141	SOP 140-2	SOP 141	SOP 108
BINSAR RAW MILK	28/06/19	501	4.09	3.37	4.89	12.86	403000	-0.518	-0.520
BINSAR A+	28/06/19	507	5.33	3.27	5.63	14.50	460000	-0.521	-0.521

Results Summary

Aflatoxin M1 in Milk

Laboratory ID	Sample ID	Aflatoxin M1
	Units	µg/L
	Reporting Limit	0.005
19-22132-1	Binsar Raw Milk (501)	0.164
19-22132-7	Binsar A+ (507)	0.210

Feed 50 ppb AFB1 / carry over 1 % ->Milk : 0,5 ppb or 500 ppt M1
Feed 75 ppb AFB1 / carry over 1 % ->Milk : 0,75 ppb or 750 ppt M1
Feed 100 ppb AFB1 / carry over 1 % ->Milk : 1,0 ppb or 1000 ppt M1
Feed 150 ppb AFB1 / carry over 1 % ->Milk : 1,5 ppb or 1500 ppt M1
Feed 200 ppb AFB1 / carry over 1 % ->Milk : 2,0 ppb or 2000 ppt M1
Feed 300 ppb AFB1 / carry over 1 % ->Milk : 3,0 ppb or 3000 ppt M1

3 Kg/ t TMR SANFED ULTRA

Feed 50 ppb AFB1 97 % Absorption -> 1 PPB → carry over 1 %→ MILK : 10 PPT
Feed 100 ppb AFB1 98 % Absorption -> 2 PPB → carry over 1 %→ MILK : 20 PPT
Feed 200 ppb AFB1 99 % Absorption -> 2 PPB → carry over 1 %→ MILK : 20 PPT
Feed 500 ppb AFB1 99 % Absorption -> 5 PPB → carry over 1 %→ MILK : 50 PPT

Ewes Trial 2/ Sanfed Ultra: NAGREF (National Agriculture Research Foundation) Published (gen.2)

Results in dairy ewes

Dairy ewes (43 to 103 days postpartum)				
Average daily production (g/day)	Feeding groups			
	AC 0	AC 2.5	AC 5.0	AC 7.5
Milk	1565	1635	1600	1592
Fat	95.8	107.6	110.0	94.2
Protein	83.3	87.5	87.9	81.9
Lactose	78.2	77.9	76.9	78.3
Ash	12.0	13.2	13.0	12.7

AC 0 = Control group, AC 2.5 = treatment with 2.5g / kg, AC 5.0= treatment with 5g / kg, AC 7.5g/kg
Kotsampasi et al. 2017

Dairy Trial 3/ Sanfed Powder: NAGREF Published (gen.1)

Results in dairy cows

Dairy cows (12 to 24 th days postpartum)		
Daily production (kg/day)	Treatment	
	Atta 0	Atta 10
Milk	25.3	25.6
Fat	0.82	0.81
Protein	0.82	0.86
Lactose	1.24	1.25
Ash	0.17	0.17

Dairy cows (12 to 24 th days postpartum)		
Milk content (g/day)	Treatment	
	Atta 0	Atta 10
Fat	32.7	31.4
Protein	33.1	33.8
Lactose	49.0	48.9
Ash	6.7	6.8
SCC (x 100/ml)	138.7	105.1
CFU (x 1000/ml)	58.6	41.9

Bampidis et al. 2014

Dairy Trial 4/ Kleentox Plus: Vet school Budapest published (gen.4)

KleenTox® Plus: mechanically/thermally activated micronized magnesium alumino-silicate clay, with selected yeast cell wall.

- The 3 kg KleenTox Plus /t TMR concentration results in 99% aflatoxin and ZEA deactivation in the bovine rumen during 24 hour residence time.
- Recommended mixing ratio is 3 kg/t TMR.

Added Mycotoxin level:

Toxin	Rumen fluid pH 7.0	Rumen fluid pH 5.0
Aflatoxin (µg/kg)	100	50
Aflatoxin (µg/kg)	500	200
Zearalenone(µg/kg)	2000	1000
Zearalenone (µg/kg)	1000	500

The test incubation time is 0, 6 and 24 hours. Two pH value were tested, pH=7.0 and pH=5.0. Each tested points were analyzed in three parallel analyses. The tested KleenTox Plus quantity: 1, 2, and 3kg / t TMR.

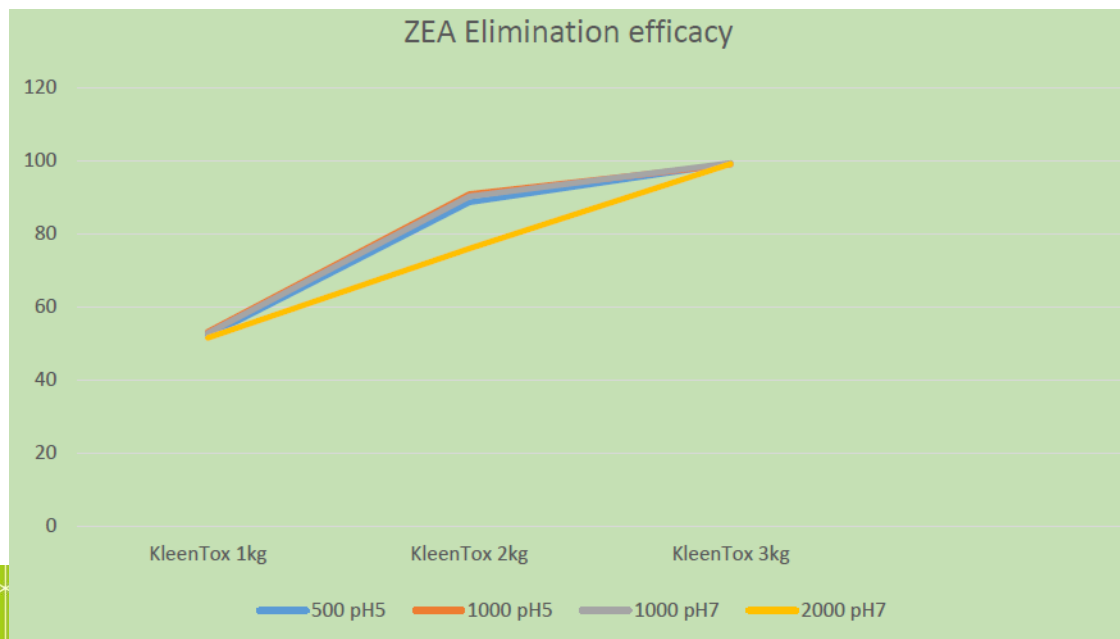
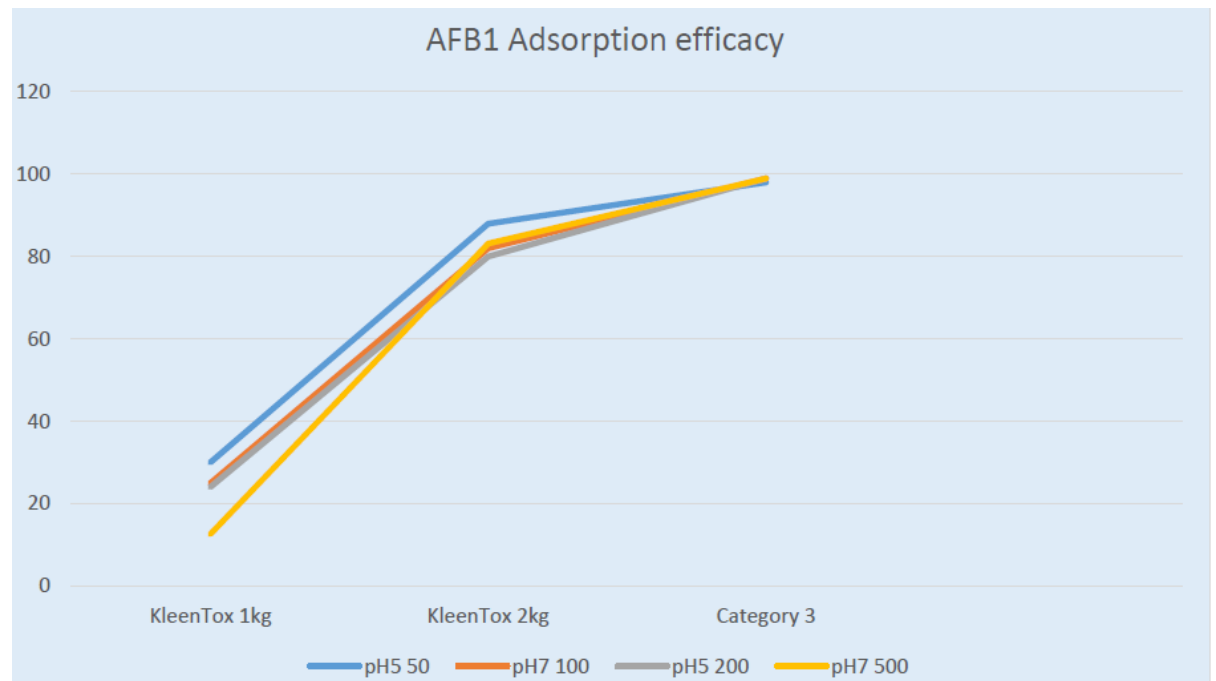
Summary of the AFB1 and ZEA adsorption and elimination results for KleenTox Plus (24h time and 1,2,3kg KleenTox Plus/t TMR level).

AFB1 adsorption capacity at different KleenTox Plus level after 24h.

pH=5						pH=7					
50 µg/kg			200 µg/kg			100 µg/kg			500 µg/kg		
1kg/t	2kg/t	3kg/t	1kg/t	2kg/t	3kg/t	1kg/t	2kg/t	3kg/t	1kg/t	2kg/t	3kg/t
30%	88%	98%	24%	80%	99%	25%	82%	99%	12.6%	83.2%	99%

ZEA elimination capacity at different KleenTox Plus level after 24h.

pH=5						pH=7					
500 µg/kg			1000 µg/kg			1000 µg/kg			2000 µg/kg		
1kg/t	2kg/t	3kg/t	1kg/t	2kg/t	3kg/t	1kg/t	2kg/t	3kg/t	1kg/t	2kg/t	3kg/t
52%	86.6%	92.2%	53.2%	90.8%	98.9%	52.8%	90.2%	99.3%	51.5%	75.9%	99.1%

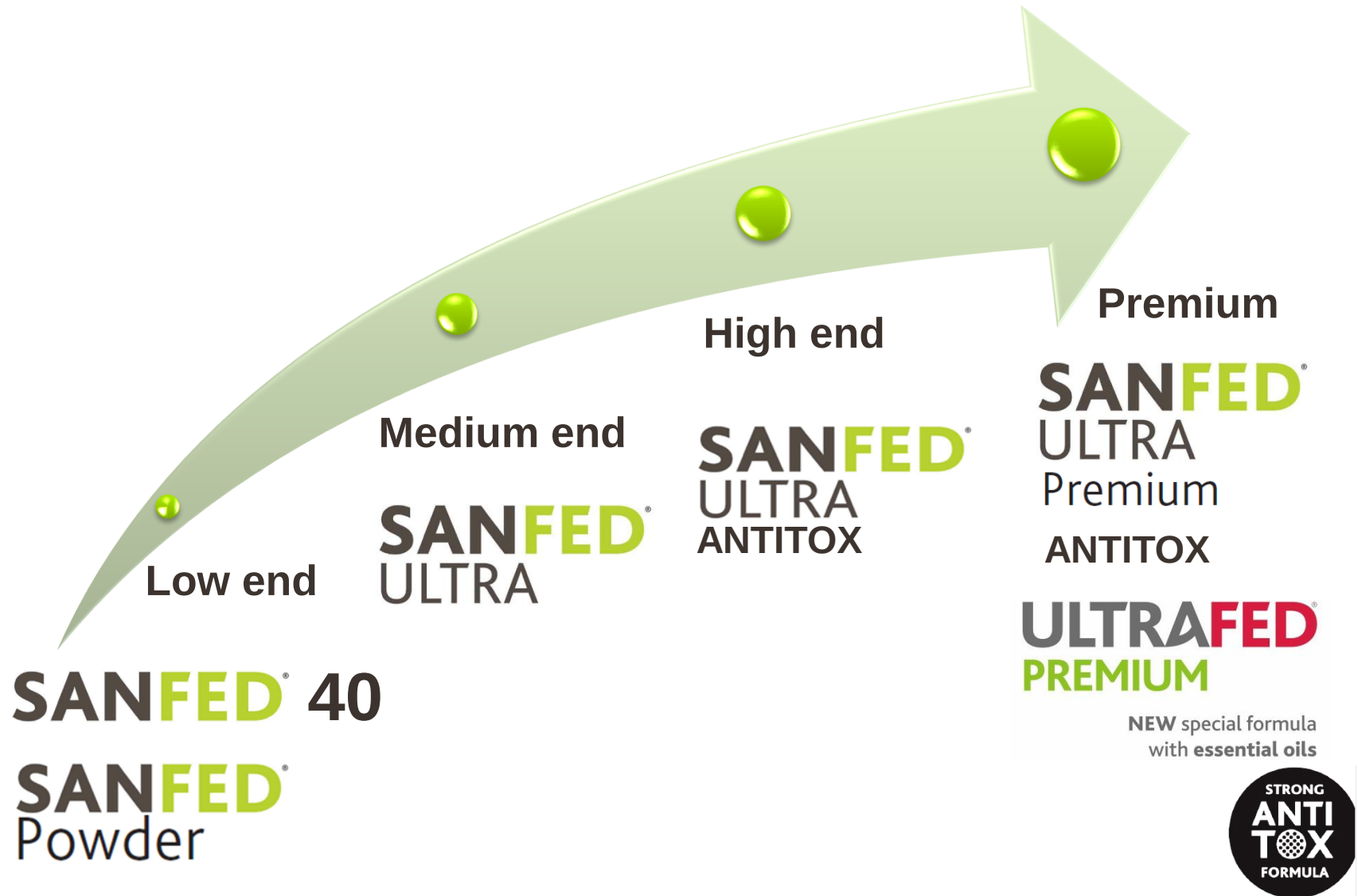


Pigs Trial 1/ Ultrafed Pigs: GROUPE Michel France-Feed: Published (gen.4)

ULTRAFED

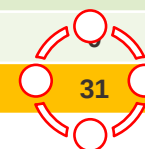


Toxin binders GEOH : Four product generations



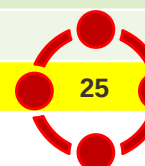
- **Control:** Use of Colistin + CTC + Antiparasite (DWG & Mortality)

Bande	Nb_1_Tem	Pm_1_Tem	Pm_3_Tem	GMQ_14_Tem	GMQ_28_Tem	GMQ_42_Tem	Pertes_Tem
24/08/2011	97	6,43	23,90	216.201	547.214	426.112	2
14/09/2011	111	7,22	27,48	226.503	589.313	471.188	7
04/10/2011	102	6,92	25,58	192.907	539.705	428.227	3
26/10/2011	117	7,16	26,45	250.205	563.950	459.369	7
07/12/2011	107	7,79	29,78	254.576	635.454	502.326	2
29/12/2012	136	6,68	26,68	254.229	564.957	461.381	3
19/01/2012	147	6,06	27,06	346.408	576.832	500.024	7
08/02/2012	106	6,00	26,86	342.325	573.894	488.770	9
Total	923	6,78	26,73	260.419	573.915	467.174	31

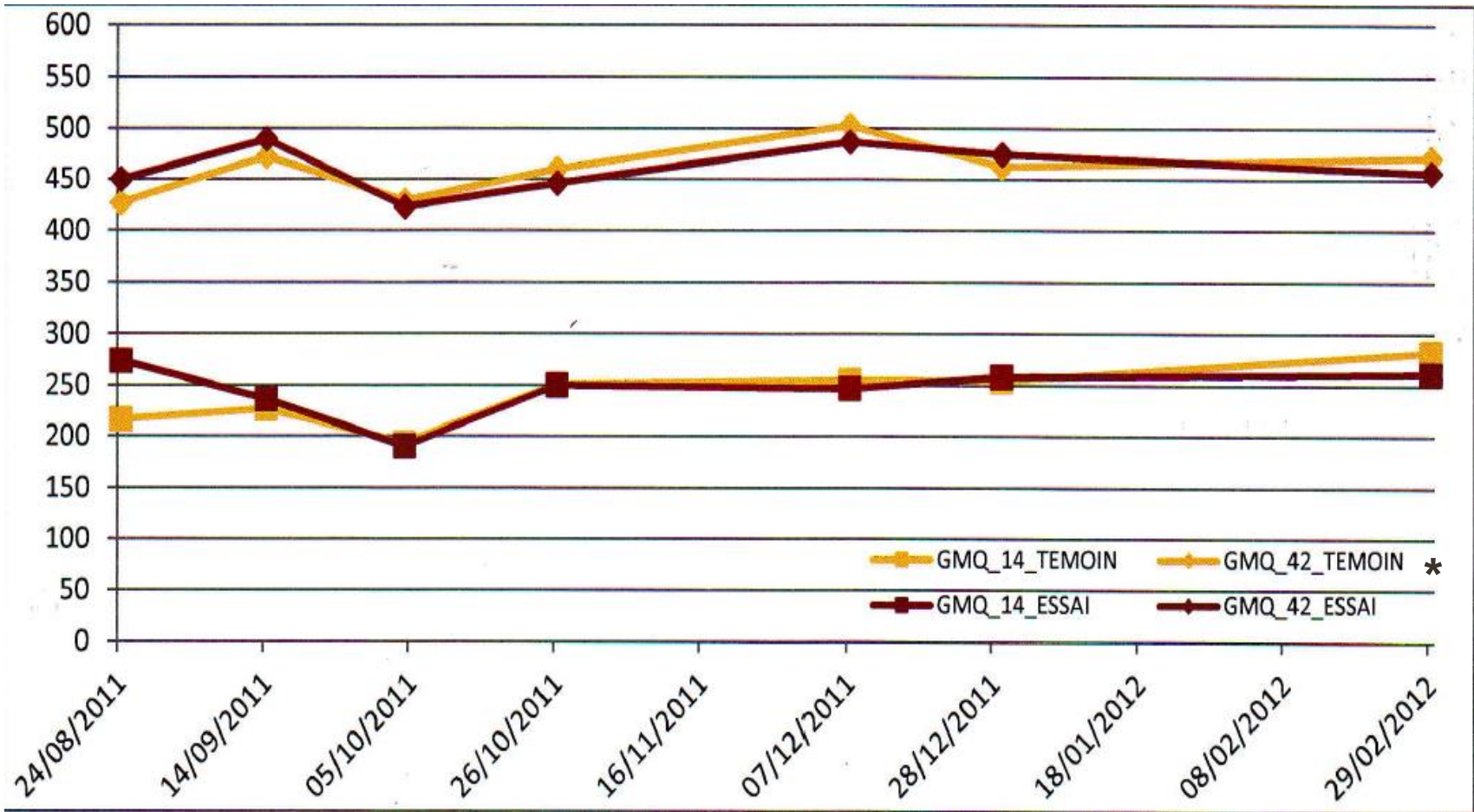


- **Ultrafed Pigs Treatment:** Ultrafed Pigs + Antiparasite (DWG & Mortality)

Bande	Nb_1_Tem	Pm_1_Tem	Pm_3_Tem	GMQ_14_Tem	GMQ_28_Tem	GMQ_42_Tem	Pertes_Tem
24/08/2011	100	6,42	24,84	273.658	550.409	449.159	4
14/09/2011	103	8,18	29,20	236.207	610.746	488.803	6
04/10/2011	134	6,99	25,46	190.110	530.744	422.657	5
26/10/2011	138	6,68	25,39	250.028	543.163	445.452	5
07/12/2011	108	7,01	27,98	246.828	600.693	486.265	0
29/12/2012	79	7,13	27,03	258.139	581.815	473.923	2
19/01/2012	111	7,19	25,73	237.064	543.744	441.517	3
08/02/2012	121	8,10	25,98	245.121	516.222	425.855	5
Total	894	7,21	26,45	242.144	559.692	454.204	25



Attapulgite – Trial – French Farms/ DWG 14 & 42 days in various buildings

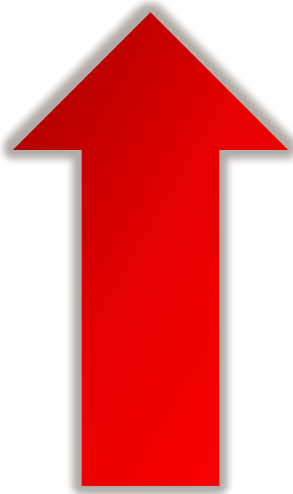


Yellow color = Control - Antibiotics

Red color = Ultrafed

DWG: Daily Weight Gain

Pigs Trial 1/ Ultrafed Pigs: GROUPE Michel France-Feed: Published (gen.4)



**Control: USE OF COLISTIN + CTC +
Antiparasite (DWG)**

Cost 95 € / MT

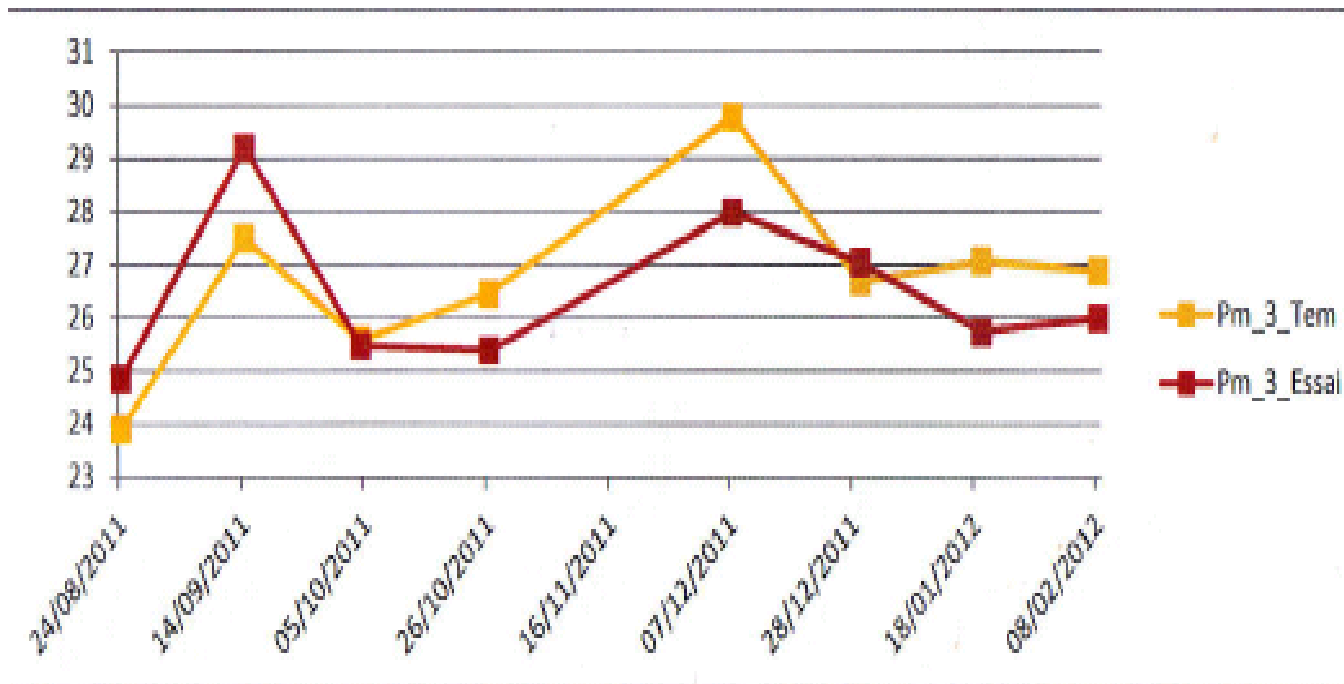


Ultrafed : ULTRAFED® PIGS + Antiparasite (DWG)

Cost 18,40 € / MT



Pigs Trial 1/ Ultrafed Pigs: GROUPE Michel France-Feed: Published (gen.4) - Mortality

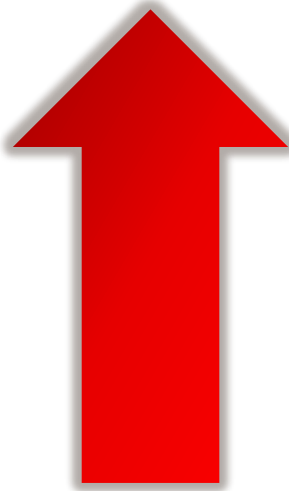


Mortality:

Yellow color = Control – Antibiotics - 3.3 %

Red color = Ultrafed – 2.8 %

Pigs Trial 1/ Ultrafed Pigs: GROUPE Michel France-Feed: Published (gen.4)



**Control: USE OF COLISTIN + CTC +
Vermifuge**

(Mortality) 31 / 923 = 3.3 %



Ultrafed: USE OF ULTRAFED® PIGS + Vermifuge
(Mortality) 25 / 894 = 2.8 %

Pigs Trial 2/ Ultrafed Pigs: SARL SELECT

PORC: Field Trial (gen.4)

Units SA Vilaine	Without Ultrafed Pigs		Use of Ultrafed Pigs in Weaning and Growing			
Year	2009	2010	2011	2012	2013	2014
No. of Sows	2859	2859	3019	3081	3067	3153
FCR Weaning –Fattening	2,85	2,80	2,65	2,67	2,69	2,63
Mortality (%)	6,7	7,9	6	5,5	4,9	5,4
Plus Value (€)	0,137	0,137	0,178	0,173	0,167	0,172
Veterinary Cost / Sow	143	167.4	125	130	146	156
Antibiotics Cost / Sow (€)	38	28,8	15	15,8	16,0	20,9

Pigs Trial 3/ Sanfed Powder: Vet school Bologna-Italy: Published (gen.1)

SANFED
Powder

GROUPS	CONTROL	ATTAPULGITE	S.D.
Attapulgitte Clay	--	15 Kg / MT	--
Number of Animals	52	52	--
Initial Weight (Kg)	7,5	7,3	n.s.
Final Weight (Kg) 72 days	28	29,3	P<0.01
DWG 26-72 days (g)	435	471	P<0.01
Replications	4	4	--
Feed Consumption 26-72 days (g)	746	718	n.s.
FCR 26-72 days	1,83	1,61	P<0.01

Pigs Trial 3/ Sanfed Powder: Vet school Bologna-Italy: Published (gen.1)

SANFED
Powder

Health parameters

GROUPS	CONTROL	ATTAPULGITE	S.D.
Attapulgitte Clay	0	15 Kg / MT	
Nb of animals	52	52	
Mortality (%)	1,9	1,9	--
Diarrhea Index (Scouring)	1,05	1,01	--
Nb of diarrhea cases	12	4	P<0.05
Mild (%)	33,3	100	P<0.01
Medium (%)	66,6	0	P<0.01
Severe (%)	--	--	--
Dry matter of feces (%)	26,31	27,60	P<0.0001

Diarrhea Index : 1-Normal , 2-Mild, 4-Medium, 6-Severe

Pigs Trial 4/ Ultrafed Pigs: Vet school AUT

Phd work: Published (gen.4)

ULTRAFED

Area	Group	FCR Global	DWG Global (g)	Final Weight at slaughter (kg)
KATERINI 800 sows	Control	2,6 ^α	609 ^α	100,6 ^α
	Ultrafed	2,5 ^β	629 ^β	104,9 ^β
FILIPPIADA 500 sows	Control	2,2 ^α	613 ^α	101,3 ^α
	Ultrafed	2,2 ^α	645 ^β	105,3 ^β
TRIKALA 500 sows	Control	2,7 ^α	530 ^α	103,9 ^α
	Ultrafed	2,5 ^β	602 ^β	116,3 ^β

Attapulgite Product series – Production Parameters

Overall...



«Use of attapulgite products in aquaculture»

1. Enhanced Production Indexes – Pelletization

2. Mycotoxins

3. Unit Management



Mycotoxins in aquaculture: Innovative management practices to protect fish and consumer health

Evaluation of clay-based products in aquaculture for their binding activity in mycotoxin cocktail (AFB1, DON and FB1) feed for sea bream (*Sparus Aurata*).

Improvement of zootechnical indicators related to the increase and utilization of food:

- weight gain (WG),
- growth rate (GR),
- specific growth rate (SGR),
- feed conversion rate (FCR),
- the robustness index (K)
- food intake (DFI)
- the improvement of technological characteristics (pellet hardness & durability)

MycoNOs



MycoNOs (2023)

Mycotoxins in aquaculture: Innovative management practices to protect fish and consumer health

Experiment Description

COCKTAIL	DON	3000ppb
	FUM	3000ppb
	AFB1	50ppb
Experimental diets		
DIET 1	Commercial feed with cocktail of toxins	
DIET 2	MycBin 1 (attapulgitite with carbon) + COCKTAIL	
DIET 3	MycBin 2 (bentonite with yeast, algae) + COCKTAIL	
DIET 4	Free of toxins & binders commercial feed	

- Ad libitum
 - 6 ημέρες την εβδομάδα
 - 2 φορές την ημέρα

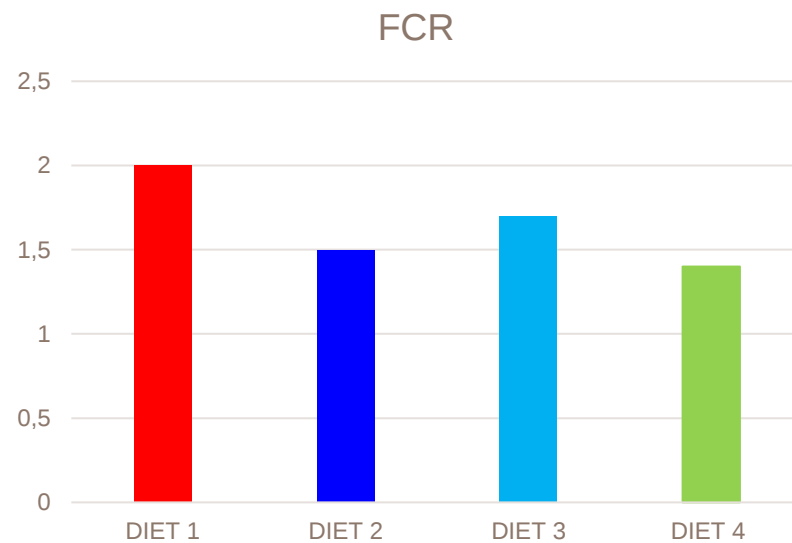
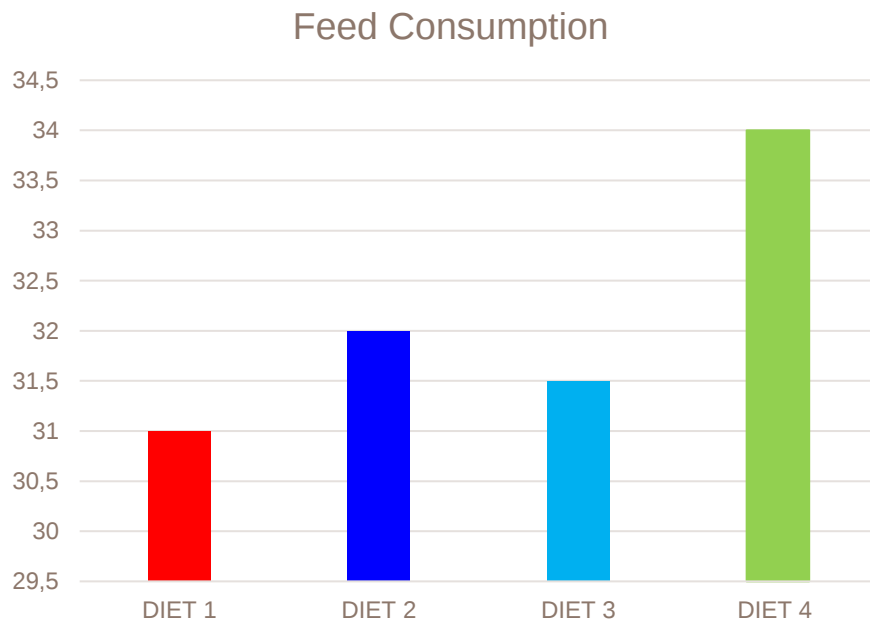
T: 21 ± 1°C
 Ph: 8,0 ± 0,4
 S: 33 ± 0,5g/L

S. aurata (M.B.)
 2,87 ± 0,2g

x12

MycoNOs (2023)

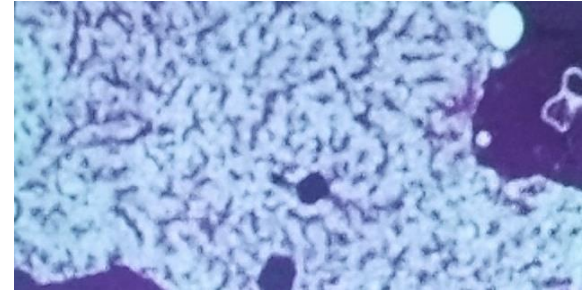
Mycotoxins in aquaculture: Innovative management practices to protect fish and consumer health



Mycotoxins in aquaculture: Innovative management practices to protect fish and consumer health

HISTOLOGY

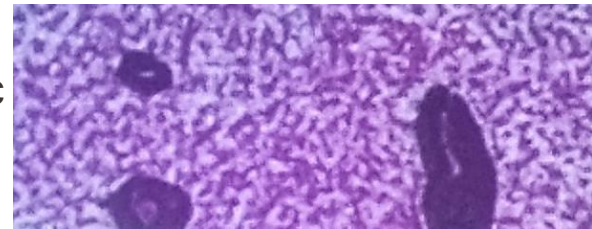
- DIET 1 → pronounced & diffused degeneration of the hepatic parenchyma with vacuolation of hepatocytes



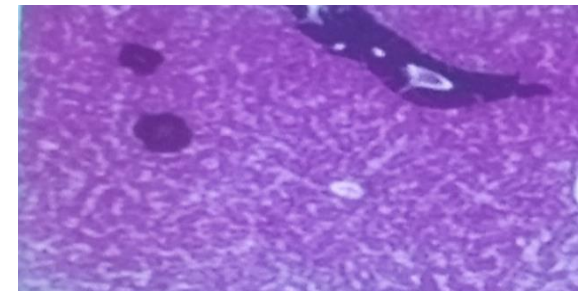
- DIET 2 → Mild degeneration in small areas of the liver with vacuolation of hepatocytes



- DIET 3 → Diffused degeneration of the hepatic parenchyma with vacuolation of hepatocytes



- DIET 4 → Normal hepatic parenchyma



MycoNOs (2023)

Mycotoxins in aquaculture: Innovative management practices to protect fish and consumer health

	1 ST MEASUREMENT		2 ND MEASUREMENT		3 RD MEASUREMENT		
WEIGHT(g)	X ± SD	N	X ± SD	N	X ± SD	N	Weigh gain 1 st – 3 rd measurement
CONTROL	155,80±12,40	90	212,80±23,80	87	390,9±34,2	83	235,1
CONTROL	159,40±15,70	85	219,40±24,10	94	383,10±36,1	107	223,7
CONTROL	158,70±14,70	94	215,80±29,40	89	392,30±8,9	80	233,6
MYCBIN 1	157,10±11,70	102	220,70±24,10	92	389,80±28,6	104	232,7
MYCBIN 1	154,40±9,05	91	218,10±25,70	87	396,21±22,7	83	241,8
MYCBIN 2	160,1±10,10	98	217,90±28,10	89	395,40±32,9	80	235,3
MYCBIN 2	152,90±16,10	95	214,50±29,10	78	396,70±32,4	97	243,8
MYCBIN 2	155,20±13,10	112	215,90±19,10	45	391,50±33,3	75	236,3
MYCBIN 2	160,20±19,10	91	217,00±21,10	128	385,20±32,4	82	225

Summarizing

- Using attapulgite in aquaculture industry can provide significant improvements in many areas and proliferate benefits can be achieved

Enhance Durability and Hardness of pellet

Mycotoxin Binding Capacity

Antidiarrhea Effect

Intestinal & Digestive health

Growth Promotion

Financial Benefit





THANK YOU



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