



Feeding Guidelines for Nicholas and B.U.T. Medium Lines

Nicholas



B.U.T.



AVIAGEN MEDIUM LINES NUTRITION GUIDELINES

Following on from the review of feeding guidelines for the Aviagen heavy lines the nutritionists at Aviagen Turkeys have looked at the requirements for the medium lines.

The medium lines tend to be used in more diverse growing systems than the heavy lines. While the heavy lines are usually grown as large birds for catering or deboning the medium lines can be grown for whole bird, cut-up, or deboning and can be processed at a range of ages and weights. Growing conditions for medium birds can also be more variable in killing age and weight than for the heavy lines.

So the new feeding guidelines have been developed to help support performance in these variable situations. Our concepts have been to develop feeding guidelines that will:-

- Be relevant to a range of management programmes
- Maximise growth and yield
- Promote health and performance
- Support the latest performance guidelines

The feeding guidelines for heavy medium lines are based on 3 week phases and these are considered as suitable for males and females grown together or separately. The nutritional guidelines are shown in Table 1 as nutrients per unit of energy.

With the development of the super medium lines we have also taken into account the potential that can be exploited in these products by looking closely at the early nutrition. For the super medium lines one of the important areas for nutrition response is in the early period and to capitalise on this there are specific starting recommendations in the feeding guidelines. The feeding of a higher nutrient density starter for the first two weeks is shown in the guidelines. Table 2 shows nutrient per unit of energy for the Heavy Medium lines.

Example feeding programmes are shown in Table 3.

From a practical approach the use of 2 or 3 week feeding phases do not always match to specific management situations and so to allow flexibility in the feed programme development a spreadsheet calculator has been set up which allows the users to modify the feeding ages to find out the nutrient levels that will best suit their specific situation. Examples of feeding programs using this calculator are shown in tables 4A and 4B.

Feed Density

The recommendations in the Tables below assume a fixed relationship between diet energy and nutrient levels in each phase. The decision on what energy density should be used needs to take into account several factors:

- **Economics**
 - current and future prices for feed and feed ingredients
 - current and future prices for sales of the meat and products
- **The objectives of the company or farmer**
 - lowest cost of liveweight production
 - least cost deboned breast meat
 - maximised yield from the facilities
- **Health status of the turkeys**
 - in areas of high disease challenge higher density nutrition can help to support the turkeys during periods of risk.
- **Weather conditions**
 - in hot weather feed intake may be reduced with a consequence of lower weights or meat yields.

Aviagen nutrition specialists can work with individual companies to select the best options for their specific situation.

Ideal Protein Model

The relationship between the energy level of the diet and the amino acids is set by the energy:Lysine level and then other amino acids are calculated based on the lysine level using an Ideal Protein model. This relationship is shown in the table below and while it is based on best current knowledge and practice it is intended as a guide rather than a definitive recommendation.

Age-Days Males	Age-Days Females	Lysine	Meth	M+C	Thr	Trp	Arg	Val	Ileu
1-21	1-21	100%	36%	65%	58%	14%	102%	67%	61%
22-42	22-42	100%	36%	66%	59%	16%	103%	68%	61%
43-63	43-56	100%	37%	67%	60%	16%	103%	69%	62%
64-84	57-70	100%	38%	68%	61%	16%	103%	70%	62%
85-105	71-84	100%	38%	70%	62%	18%	103%	71%	63%
106-126	85-98	100%	41%	74%	62%	19%	104%	72%	64%
127-147	99-126	100%	43%	78%	63%	20%	105%	74%	65%

Feed Programme Calculator

The Aviagen Feed Calculator for Medium lines is available on the Aviagen Turkeys website as an excel spreadsheet. This tool allows users to enter their current or planned feeding programme and the energy level of the diets that will be used. Up to 10 feeding periods can be accommodated. The spreadsheet uses a regression equation to calculate the lysine level based on the age of the turkeys at the middle of each feeding period. The other amino acids are then calculated from the lysine level using the ideal protein relationship described above.

There are the options to look at Total and Digestible amino acids for the heavy medium and super medium lines.

Feed Presentation and Composition

For turkeys the presentation of the feed can be as important as the nutrient content. To stimulate and drive growth the turkeys need to be able to consume large quantities of feed on a regular basis. Any factors that delay or discourage the poults from feeding will result in slower development than the target.

Feed Structure

In the first 24 -72 hours it is very important to get the poults to consume as much food as possible. Early management in terms of feed presentation, lighting and temperature must encourage the poults to eat.

To start the poults the diet needs to have enough structure to enable the young birds to pick up particles. If it is too fine and dusty then the poults may not be able to select enough particles and will not consume enough however if the particles are too large then the poults will not be able to swallow them and so will not eat enough food to get them off to a good start.

To manufacture good pellets and crumbles many feedmills will grind the ingredients to a fine powder to improve the cohesion when it is conditioned and pelleted. When the turkey consumes these pellets or crumbles the processed feed will dissolve into a fine slurry in the crop when mixed with water, this then passes in the gizzard. The gizzard should act to further process the feed by grinding it down, but without any coarse structure the gizzard muscles do not develop and the enzyme production is low. Using coarsely ground cereals or adding whole or cracked grains of cereals to the diet will stimulate the gizzard to develop naturally and will increase enzyme production, improve food utilisation, improve litter conditions and help to reduce enteric problems.

Feed Composition

The ingredients that are used in the diets need to be highly digestible and of the best quality available. Attention should be paid to the quality of high protein materials. The inclusion of fishmeal in diets for young turkeys, where permitted, helps to improve the amino acid balance and reduces the risks from over reliance on Soyameal as the only protein source. The use of ingredients with protein of low digestibility should be restricted. Undigested protein can accumulate in the caecae of the turkey and stimulate proteolytic bacterial development resulting in digestive upsets and wet droppings and this can lead to increased condemnations.

Fats are important energy source in turkey diets but young turkeys have a limited capacity to digest some of the fatty acids. Generally the use of pure vegetable oils like soyabean or sunflower oil is recommended for starter diets and the proportion of lower quality fats or blends with higher levels of free fatty acids or high in palmitic or stearic acid should be restricted until the turkeys get older.

Feed enzymes should be used to improve the availability of nutrients in feed ingredients wherever possible. Xylanase and Beta Glucanase should be used to treat cereals with high NSP (None starch Polysaccharide), and Phytase enzymes can be used to release the phosphorus bound as phytate in vegetable ingredients.

The balance of ingredients across the range of turkey diets is important to ensure that the transition from one diet to the next does not cause a change in gut integrity. The digestive system of a turkey is a dynamic environment relying on regular inputs of feed. Within this environment the balance of nutrients and electrolytes can be affected by the diet composition and the microflora of the gut. Changes in the rate of feed consumption or the mixture of ingredients within the diets can alter the balance. Within small tolerances the gut will control the natural equilibrium however larger changes can trigger shifts in the bacterial population and may lead to digestive upsets and enteritis. So the rate of change of ingredients across the range of diets needs to be managed to minimise potential balance shifts.

This can best be done by limiting the change in inclusion to a maximum of 25% of the inclusion level from one diet to the next. For instance if wheat middlings are included at 10% in a Phase 3 diet then the Phase 4 diet should have no more than 12.5% or no less than 7.5%.

Table 6 shows guidelines for the inclusion of some feed ingredients

Whole Grain

The addition of whole grain to the diets helps improve gut integrity and allows the producer some flexibility in adjusting diet composition and controlling cost.

There are different ways that whole grain is now used to feed turkeys:-

1. In a balanced way when the grain is added at controlled levels and the diets are adjusted to take account of this so that the correct nutrient package is consumed. The inclusion of whole grain can be at the feedmill or on the farm using blending systems.
2. The other way is dilution of the diet and may be at a controlled or uncontrolled levels. For a controlled programme a series of addition levels can be calculated to ensure the overall combination of feed and grain matches the turkeys requirement. In an uncontrolled programme the level added may be dictated by the farmers reaction to bird weight or performance and the level of grain adjusted depending on the desired outcome. Dilution of the diet can lead to suboptimal performance, but can also result in a reduced cost of gain, such programmes should be agreed between growers and processors.

Feed Management

On the farm the presentation of the feed needs to be suitable to encourage maximum consumption by the turkeys. The feed should meet the standards shown in Table 5 to ensure the crumbles or pellets actually arriving at the feeder are suitable for the turkeys to readily consume.

The feeders should be kept clean and free from contamination and the level of fines should not be allowed to build up. As a management tool it can be useful to turn off the feeders for a short period each day to encourage the turkeys to clean down the pans and to stimulate appetite.

To reduce nutritional stress to the bird due to any change in the feed (raw material profile, presentation), a gradual transition between two sequential diets can be achieved by mixing the two rations together for 1-2 days, if the farm has the correct equipment (2 silos). ATL Technical advisers can provide more information on these techniques.

It is also very important to check that the equipment (feeders and drinkers) provided during the brooding phase is adequate to ensure all the poults have free and easy access to food and water. More information is given in ATL Management guides

Water Quality

Water is an essential ingredient for life, a clean supply of which should be readily available from placement throughout production. Any restriction in water intake or contamination of water per se will ultimately affect the growth rate and overall performance of the turkey. There are many factors that can affect water intake including age, sex, environmental temperature, water temperature and the drinker system type. The bacterial and physical quality of water should be monitored regularly and where required corrective action taken to ensure that bird performance is not compromised. Depending on the source, the water supplied to the birds may contain excessive amounts of various minerals or be contaminated with bacteria. Acceptable levels of minerals and organic matter in the water supply are given in Table 8.

**TABLE 1: FEEDING RECOMMENDATIONS FOR THE AVIAGEN HEAVY MEDIUM LINES
NUTRIENTS as %/1000 Kcal/kg**

	DAYS DAYS	0-21		22-42		43-63		64-84		85-105		106-126		127-147	
		Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible
AMINO ACIDS															
Lysine		0.651	0.618	0.564	0.530	0.489	0.455	0.424	0.390	0.364	0.335	0.316	0.287	0.271	0.246
Methionine		0.234	0.223	0.203	0.191	0.181	0.168	0.161	0.148	0.138	0.127	0.129	0.118	0.116	0.106
Methionine + Cystine		0.423	0.402	0.372	0.350	0.328	0.305	0.289	0.265	0.255	0.234	0.234	0.213	0.211	0.192
Tryptophan		0.091	0.087	0.090	0.085	0.078	0.073	0.068	0.062	0.066	0.060	0.060	0.055	0.054	0.049
Threonine		0.377	0.359	0.333	0.313	0.294	0.273	0.259	0.238	0.226	0.208	0.196	0.178	0.171	0.155
Arginine		0.664	0.631	0.581	0.546	0.504	0.469	0.437	0.402	0.375	0.345	0.328	0.299	0.284	0.259
Valine		0.436	0.414	0.384	0.361	0.338	0.314	0.297	0.273	0.258	0.238	0.227	0.207	0.200	0.182
iso-Leucine		0.397	0.377	0.344	0.324	0.303	0.282	0.263	0.242	0.229	0.211	0.202	0.184	0.176	0.160
MINERALS															
Calcium		0.494		0.444		0.393		0.351		0.301		0.268		0.234	
Available Phosphorus		0.251		0.222		0.197		0.176		0.151		0.134		0.117	
NPP [†]		0.241		0.220		0.199		0.178		0.152		0.133		0.116	
Sodium**		0.057		0.054		0.051		0.048		0.045		0.044		0.042	
Chloride**		0.067		0.064		0.060		0.057		0.054		0.054		0.054	

* None Phytate Phosphorus. Further information on phosphorus is available in Avigen technical publication: REVISED PHOSPHORUS AND CALCIUM GUIDELINES FOR TURKEYS 2011

** Electrolyte levels are shown as an indication but should be adjusted to local conditions to control moisture content of the bedding.

**TABLE 1: FEEDING RECOMMENDATIONS FOR THE AVIAGEN HEAVY MEDIUM LINES
NUTRIENTS as gms/(MJ/kg)**

	DAYS DAYS	0-21		22-42		43-63		64-84		85-105		106-126		127-147	
		Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible
AMINO ACIDS															
Lysine	%	1.56	1.48	1.35	1.27	1.17	1.09	1.01	0.93	0.87	0.80	0.75	0.69	0.65	0.59
Methionine	%	0.56	0.53	0.49	0.46	0.43	0.40	0.39	0.35	0.33	0.30	0.31	0.28	0.28	0.25
Methionine + Cystine	%	1.01	0.96	0.89	0.84	0.78	0.73	0.69	0.63	0.61	0.56	0.56	0.51	0.50	0.46
Tryptophan	%	0.22	0.21	0.22	0.20	0.19	0.17	0.16	0.15	0.16	0.14	0.14	0.13	0.13	0.12
Threonine	%	0.90	0.86	0.80	0.75	0.70	0.65	0.62	0.57	0.54	0.50	0.47	0.43	0.41	0.37
Arginine	%	1.59	1.51	1.39	1.31	1.20	1.12	1.04	0.96	0.90	0.82	0.78	0.71	0.68	0.62
Valine	%	1.04	0.99	0.92	0.86	0.81	0.75	0.71	0.65	0.62	0.57	0.54	0.49	0.48	0.44
iso-Leucine	%	0.95	0.90	0.82	0.77	0.73	0.67	0.63	0.58	0.55	0.50	0.48	0.44	0.42	0.38
MINERALS															
Calcium	%	1.18		1.06		0.94		0.84		0.72		0.64		0.56	
Available Phosphorus	%	0.60		0.53		0.47		0.42		0.36		0.32		0.28	
NPP*	%	0.58		0.52		0.47		0.42		0.37		0.32		0.28	
Sodium	%	0.16		0.15		0.15		0.14		0.14		0.13		0.13	
Chloride	%	0.14		0.13		0.12		0.11		0.11		0.10		0.10	
Linoleic Acid (18:2)	%	0.16		0.15		0.14		0.14		0.13		0.13		0.13	

* None Phytate Phosphorus. Further information on phosphorus is available in Aviagen technical publication: REVISED PHOSPHORUS AND CALCIUM GUIDELINES FOR TURKEYS 2011

** Electrolyte levels are shown as an indication but should be adjusted to local conditions to control moisture content of the bedding.

**TABLE 2: FEEDING RECOMMENDATIONS FOR AVIAGEN SUPER MEDIUM LINES
NUTRIENTS as %/1000 Kcal/kg**

RATION NUMBER	DAYS	1		2		3		4		5		6		7		8	
		Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible
MALES	0-14	0.693	0.658	0.632	0.594	0.562	0.523	0.488	0.449	0.418	0.385	0.363	0.330	0.319	0.306	0.281	0.269
FEMALES	0-14	0.247	0.235	0.225	0.212	0.204	0.190	0.180	0.166	0.157	0.144	0.139	0.127	0.130	0.125	0.121	0.115
AMINO ACIDS		0.449	0.427	0.410	0.385	0.371	0.345	0.327	0.301	0.285	0.262	0.253	0.231	0.237	0.227	0.219	0.210
Lysine		0.099	0.094	0.090	0.085	0.089	0.083	0.078	0.072	0.069	0.063	0.066	0.060	0.062	0.059	0.055	0.053
Methionine		0.402	0.382	0.367	0.345	0.332	0.308	0.293	0.269	0.254	0.234	0.224	0.204	0.197	0.189	0.178	0.170
Methionine + Cystine		0.706	0.670	0.644	0.605	0.578	0.537	0.501	0.461	0.431	0.397	0.373	0.340	0.333	0.319	0.295	0.282
Tryptophan		0.464	0.441	0.423	0.398	0.382	0.356	0.336	0.309	0.293	0.269	0.258	0.234	0.230	0.220	0.208	0.199
Threonine		0.422	0.401	0.385	0.362	0.343	0.319	0.302	0.278	0.259	0.239	0.229	0.208	0.204	0.196	0.183	0.175
Arginine																	
Valine																	
iso-Leucine																	
MINERALS																	
Calcium		0.494	0.454	0.454	0.438	0.438	0.438	0.393	0.393	0.351	0.351	0.301	0.301	0.268	0.268	0.234	0.234
Available Phosphorous		0.251	0.227	0.227	0.218	0.218	0.218	0.197	0.197	0.176	0.176	0.151	0.151	0.134	0.134	0.117	0.117
NPP*		0.241	0.227	0.227	0.218	0.218	0.218	0.199	0.199	0.178	0.178	0.152	0.152	0.133	0.133	0.116	0.116
Sodium**		0.057	0.057	0.057	0.054	0.054	0.054	0.051	0.051	0.048	0.048	0.045	0.045	0.044	0.044	0.042	0.042
Chloride**		0.067	0.067	0.067	0.064	0.064	0.064	0.060	0.060	0.057	0.057	0.054	0.054	0.054	0.054	0.054	0.054

* None Phytate Phosphorus. Further information on phosphorus is available in Aviagen technical publication: REVISED PHOSPHORUS AND CALCIUM GUIDELINES FOR TURKEYS 2011

** Electrolyte levels are shown as an indication but should be adjusted to local conditions to control moisture content of the bedding.

**TABLE 2: FEEDING RECOMMENDATIONS FOR AVIAGEN SUPER MEDIUM LINES
NUTRIENTS as gms/(MJ/kg)**

RATION NUMBER	DAYS	1		2		3		4		5		6		7		8	
		0-14	0-14	15-28	15-28	29-49	29-49	50-70	50-70	71-91	71-91	92-112	92-112	113-126	113-126	127-147	127-147
AMINO ACIDS	DAYS	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible
Lysine	DAYS	1.66	1.57	1.51	1.42	1.34	1.25	1.17	1.07	1.00	0.92	0.87	0.79	0.76	0.73	0.67	0.64
Methionine	DAYS	0.59	0.56	0.54	0.51	0.49	0.45	0.43	0.40	0.37	0.34	0.33	0.30	0.31	0.30	0.29	0.28
Methionine + Cystine		1.07	1.02	0.98	0.92	0.89	0.82	0.78	0.72	0.68	0.63	0.61	0.55	0.57	0.54	0.52	0.50
Tryptophan		0.24	0.22	0.22	0.20	0.21	0.20	0.19	0.17	0.16	0.15	0.16	0.14	0.15	0.14	0.13	0.13
Threonine		0.96	0.91	0.88	0.82	0.79	0.74	0.70	0.64	0.61	0.56	0.54	0.49	0.47	0.45	0.42	0.41
Arginine		1.69	1.60	1.54	1.45	1.38	1.28	1.20	1.10	1.03	0.95	0.89	0.81	0.80	0.76	0.70	0.67
Valine		1.11	1.05	1.01	0.95	0.91	0.85	0.80	0.74	0.70	0.64	0.62	0.56	0.55	0.53	0.50	0.48
iso-Leucine		1.01	0.96	0.92	0.87	0.82	0.76	0.72	0.66	0.62	0.57	0.55	0.50	0.49	0.47	0.44	0.42
MINERALS																	
Calcium		1.18	1.08	1.05	0.94	0.94	0.84	0.84	0.72	0.72	0.64	0.64	0.64	0.64	0.64	0.56	0.56
Available Phosphorous		0.60	0.54	0.52	0.47	0.47	0.42	0.42	0.36	0.36	0.32	0.32	0.32	0.32	0.28	0.28	0.28
NPP*		0.58	0.54	0.52	0.47	0.47	0.43	0.43	0.36	0.36	0.32	0.32	0.32	0.32	0.28	0.28	0.28
Sodium**		0.14	0.14	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.10	0.11	0.10	0.10	0.10	0.10	0.10
Chloride**		0.16	0.16	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13

* None Phytate Phosphorus. Further information on phosphorus is available in Aviagen technical publication: REVISED PHOSPHORUS AND CALCIUM GUIDELINES FOR TURKEYS 2011

** Electrolyte levels are shown as an indication but should be adjusted to local conditions to control moisture content of the bedding.

TABLE 3: GUIDELINE LEVELS OF FEED INTAKE

THESE QUANTITIES ARE GIVEN AS A GUIDE AND SHOULD BE ADJUSTED
BASED ON LOCAL DIETS AND ENERGY LEVELS

HEAVY MEDIUM

AGE - days	Kg/poult Male	Kg/poult Female	Presentation
0-25	1.10	0.85	Crumble
25-42	2.90	2.50	short pellet
42-63	5.50	4.50	3mm pellet
63-84	7.60	6.00	3mm pellet
84-105	9.40		3mm pellet
105-126	11.30		3mm pellet
127-147	As Required	As Required	3mm pellet

Target feed consumption at 21 Days should be 1.0 kg/poult minimum

SUPER MEDIUM

AGE - days	Kg/poult Male	Kg/poult Female	Presentation
0-18	0.60	0.50	1st Crumble
19-28	1.20	1.10	2nd Crumble
29-49	4.10	3.60	short pellet
50-70	6.60	5.80	3mm pellet
71-91	8.70	7.80	3mm pellet
92-112	10.50		3mm pellet
113-126	8.00		3mm pellet
127-147	As Required	As Required	3mm pellet

Target feed consumption at 21 Days should be 1.2 kg/poult minimum

TABLE 4A: HEAVY MEDIUM LINES**USER INPUTS**

Feed Number	Start Day	End Day	ME Kcals/kg	ME Kcals/kg	ME Mj/kg
1	1	21	2750	1250	11.5
2	22	42	2850	1296	11.9
3	43	63	2950	1341	12.3
4	64	84	3050	1387	12.8
5	85	105	3150	1432	13.2
6	106	126	3250	1477	13.6
7	127	147	3300	1500	13.8
8	148				
9					
10					

Feed Number	Start Day	End Day	Middle Day	ME Kcals/kg	Lysine %	Meth %	M+C %
1	1	21	11	2750	1.79	0.64	1.16
2	22	42	32	2850	1.61	0.58	1.06
3	43	63	53	2950	1.44	0.53	0.97
4	64	84	74	3050	1.29	0.49	0.88
5	85	105	95	3150	1.15	0.44	0.80
6	106	126	116	3250	1.03	0.42	0.76
7	127	147	137	3300	0.89	0.38	0.70
8							
9							
10							

* None Phytate Phosphorus. Further information on phosphorus is available in Aviagen technical papers.

** Electrolyte levels are shown as an indication but should be adjusted to local conditions to control water intake.

FEEDING PROGRAMME CALCULATOR

TOTAL AMINO ACIDS

TO SET UP A NEW FEEDING PROGRAM :-

1. ENTER THE FIRST AND LAST DAY OF EACH FEEDING PERIOD IN COLUMNS D AND E
2. ENTER THE PROPOSED ENERGY LEVELS FOR EACH DIET IN COLUMN F in MJ/KG
3. RECOMMENDED AMINO ACID AND MINERAL LEVELS WILL BE SHOWN IN THE TABLE BELOW
- 4 . PRINT OUT THE RESULT

Thr %	Trp %	Arg %	Val %	Ileu %	Calcium %	AV.Phos %	NPP* %	Sodium** %	Chloride** %
1.04	0.26	1.82	1.20	1.09	1.36	0.69	0.66	0.16	0.18
0.95	0.26	1.65	1.09	0.98	1.26	0.63	0.63	0.16	0.18
0.87	0.23	1.48	1.00	0.89	1.16	0.59	0.59	0.15	0.18
0.79	0.21	1.33	0.91	0.80	1.07	0.54	0.54	0.15	0.18
0.71	0.21	1.18	0.81	0.72	0.95	0.47	0.48	0.14	0.17
0.63	0.20	1.07	0.74	0.66	0.87	0.44	0.43	0.14	0.18
0.57	0.18	0.94	0.66	0.58	0.77	0.39	0.38	0.14	0.18

Publication:- REVISED PHOSPHORUS AND CALCIUM RECOMMENDATIONS FOR TURKEYS 2011
l moisture content of the bedding. Digestible Amino Acids based on Evonik AminoDat 3

TABLE 4A: SUPER MEDIUM LINES**USER INPUTS**

Feed Number	Start Day	End Day	ME Kcals/kg	ME Kcals/kg	ME Mj/kg
1	1	14	2750	1250	11.5
2	15	28	2850	1296	11.9
3	29	49	2950	1341	12.3
4	50	70	3050	1387	12.8
5	71	91	3125	1421	13.1
6	92	112	3175	1443	13.3
7	113	126	3250	1477	13.6
8	127	147	3300	1500	13.8
9	148				
10					

Feed Number	Start Day	End Day	Middle Day	ME Kcals/kg	Lysine %	Meth %	M+C %
1	1	14	8	2750	1.90	0.68	1.24
2	15	28	22	2850	1.80	0.64	1.17
3	29	49	39	2950	1.66	0.60	1.09
4	50	70	60	3050	1.49	0.55	1.00
5	71	91	81	3125	1.31	0.49	0.89
6	92	112	102	3175	1.15	0.44	0.80
7	113	126	120	3250	1.04	0.42	0.77
8	127	147	137	3300	0.93	0.40	0.72
9							
10							

* None Phytate Phosphorus. Further information on phosphorus is available in Aviagen technical papers.

** Electrolyte levels are shown as an indication but should be adjusted to local conditions to control water intake.

FEEDING PROGRAMME CALCULATOR

TOTAL AMINO ACIDS

TO SET UP A NEW FEEDING PROGRAM :-

1. ENTER THE FIRST AND LAST DAY OF EACH FEEDING PERIOD IN COLUMNS D AND E
2. ENTER THE PROPOSED ENERGY LEVELS FOR EACH DIET IN COLUMN F in MJ/KG
3. RECOMMENDED AMINO ACID AND MINERAL LEVELS WILL BE SHOWN IN THE TABLE BELOW
- 4 . PRINT OUT THE RESULT

Thr %	Trp %	Arg %	Val %	Ileu %	Calcium %	AV.Phos %	NPP* %	Sodium** %	Chloride** %
1.10	0.27	1.94	1.28	1.16	1.36	0.69	0.66	0.16	0.18
1.04	0.26	1.83	1.21	1.10	1.29	0.65	0.65	0.16	0.19
0.98	0.26	1.70	1.13	1.01	1.29	0.64	0.64	0.16	0.19
0.89	0.24	1.53	1.03	0.92	1.20	0.60	0.60	0.16	0.18
0.79	0.21	1.35	0.91	0.81	1.10	0.55	0.55	0.15	0.18
0.71	0.21	1.18	0.82	0.73	0.96	0.48	0.48	0.14	0.17
0.64	0.20	1.08	0.75	0.66	0.87	0.44	0.43	0.14	0.18
0.59	0.18	0.97	0.69	0.60	0.77	0.39	0.38	0.14	0.18

Publication:- REVISED PHOSPHORUS AND CALCIUM RECOMMENDATIONS FOR TURKEYS 2011
l moisture content of the bedding. Digestible Amino Acids based on Evonik AminoDat 3

TABLE 5: GUIDELINES FOR CRUMBLE AND PELLET MANUFACTURE

Ground Meal Profile – pre pelleting

	Fines	>0.2 mm	>0.5mm	>1mm	>2mm	>3.1mm
Crumble	0 – 5 %	10 – 15 %	50 – 60 %	20 – 25 %	0 – 5 %	0 – 5 %
Pellets	0 - 2 %	0 – 10 %	20 – 30 %	30 – 40 %	15 – 25 %	2 – 5 %

Crumble Profile – in front of the poults

	Fines	>0.2 mm	>0.5mm	>1mm	>2mm	>3.1mm
1st Crumble 1-14 days	0 – 2 %	5 - 10 %	20 – 25 %	45 – 55 %	15 – 20 %	0 – 3 %
2nd Crumble 15-28 days	0 - 2 %	0 – 3 %	0 – 5 %	10 – 15 %	55 – 65 %	20 –25 %

1st Pellet - to be fed after 28 days. This should have a Holmen of 88 -92% maximum and pellets should be a maximum of 3 -4 mm in length

Pellet Hardness – after delivery to farm

Pellet before Crumbling: 88 – 92 % Holmen (30 sec)

Pellets: 90 – 95% Holmen (30 sec) Maximum Fines content 10%

TABLE 6: INGREDIENT CONSTRAINTS

Age of Turkeys	0-6 Weeks		7-12 Weeks		13-15 Weeks		15-21 Weeks	
	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %
Cereals:								
Maize	0	100	0	100	0	100	0	100
Wheat ¹	20	100	20	100	20	100	20	100
Barley ¹	0	10	0	15	0	20	0	25
Triticale	0	10	0	10	0	10	0	10
Sorghum ²	0	10	0	20	0	20	0	20
Vegetable Proteins:								
Soya 48-50%	0	50	0	40	0	35	0	30
Full Fat Soya	0	10	0	10	0	10	0	10
Combined Constraint	0	40	0	40	0	15	0	15
Total Soya Products								
Extracted Rapeseed	0	2	0	3	0	5	0	7.5
Whole Rapeseed	0	2	0	3	0	5	0	10
Combined Constraint								
Total Rape Products	0	3	0	5	0	7.5	0	10
Extracted Sunflower 33-38% protein	0	5	0	5	0	5	0	7.5
Extracted Sunflower 27-30% protein	0	0	0	3	0	5	0	5
Combined Constraint	0	5	0	5	0	5	0	7.5
Total Sunflower Products								
Peas	0	5	0	5	0	7	0	10
Field Beans	0	2.5	0	3	0	5	0	5
Combined Constraint	0	5	0	5	0	7	0	10
Total Pulses								

¹ Assumes use of NSP enzyme.

² Minimum in starter diets to reduce soya levels if no other animal protein

Age of Turkeys	0-6 Weeks		7-12 Weeks		13-15 Weeks		15-21 Weeks	
	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %
Animal Proteins³								
Fish Meal	2.5 ⁴	7	0	5	0	5	0	5
Meat + Bone Meal	0	3	0	5	0	8	0	10
Poultry Meal	0	5	0	5	0	5	0	5
Cereal By-products								
Wheat Bran	0	5	0	0	0	0	0	0
Maize Gluten Meal	0	5	0	5	0	5	0	5
Middlings	0	20	0	15	0	15	0	15
Distillers Dark Grains + Solubles	0	2	0	3	0	5	0	8
Added Fats and Oils:								
Soybean or Sunflower Oil	1	5	2	5	0	5	0	10
Palm Oil	0	0	0	1	0	2	0	5
Rape Oil	0	0	0	1	0	2	0	5
Fat Blend- veg oils, low FFA, C18, 2>25%	0	2	0	3	0	5	0	10
Fat Blend-general purpose, FFA > 10%, C18, 2>20%	0	0	0	1	0	3	0	5
Tallow and Lard	0	2	0	3	0	5	0	10
Animal/Veg blend, FFA < 15%, C18.2 > 15%	0	0	0	1	0	3	0	5
Poultry Fat	0	2	0	3	0	5	0	10

³ The use of fish meal and other animal proteins may be controlled by local regulations. These should be checked before use.

⁴ Minimum in starter diets to reduce soya levels if no other animal protein used.

TABLE 7: VITAMIN AND TRACE MINERAL ADDITIONS

ADDED VITAMINS PER KG	STARTING 0-3 weeks		STARTING 4-6 weeks		GROWER 7-12 weeks		EARLY FINISHER 13-16 weeks		FINISHER 17+ weeks	
	Wheat Based	Maize Based	Wheat Based	Maize Based	Wheat Based	Maize Based	Wheat Based	Maize Based	Wheat Based	Maize Based
Vitamin A iu	12000	11000	10000	8000	8000	7000	7000	6000	6000	5000
Vitamin D3 iu	4000	4000	3500	3500	3000	3000	3000	3000	2500	2500
Vitamin E iu	100	100	50	50	30	30	25	25	20	20
Vitamin K mg	4	4	2	2	2	2	2	2	2	2
Thiamin (B1) mg	4	4	2	2	2	2	1.5	1.5	1.5	1.5
Riboflavin (B2) mg	10	10	5	5	5	5	4	4	4	4
Nicotinic Acid mg	75	80	60	65	50	55	40	45	40	45
Pantothenic Acid mg	25	28	15	16	15	16	12	12	12	12
Pyridoxine (B6) mg	7	6	5	4	4	3	3	2	2	1.5
Biotin mg	0.30	0.20	0.30	0.20	0.20	0.15	0.15	0.10	0.10	0.10
Folic Acid mg	4	4	2	2	1	1	1	1	1	1
Vitamin B12 mg	0.030	0.030	0.020	0.020	0.015	0.015	0.015	0.015	0.010	0.010
Choline mg	1200	1200	1000	1000	600	600	400	400	300	300
ADDED TRACE MINERALS PER KG										
Copper mg	12	12	12	12	12	12	12	12	10	10
Iron mg	100	100	80	80	60	60	45	45	45	45
Manganese mg	130	130	120	110	110	110	110	110	110	110
Molybdenum mg	0.5	-	-	-	-	-	-	-	-	-
Selenium mg	0.4	0.3	0.3	0.3	0.3	0.25	0.25	0.25	0.2	0.2
Zinc mg	100	100	100	100	100	100	80	80	80	80
Iodine mg	3	2	2	2	2	2	1	1	1	1

Levels of some vitamins and minerals, that can be added to the feed, may be controlled by local regulations and these should be observed. Vitamin stability can be affected by heat processing of the feed and an allowance may need to be made to offset any losses.

TABLE 8 : WATER QUALITY CRITERIA FOR POULTRY

Criteria	Concentration (ppm)	Comments
Total Dissolved Solids (TDS)	0-1000	Good
	1000-3000	Satisfactory: Wet droppings may result at the upper limit
	3000-5000	Poor: Wet droppings, reduced water intake, poor growth and increased mortality
	>5000	Unsatisfactory
Hardness	<100 Soft	Good: No problems
	>100 Hard	Satisfactory: No problem for poultry but can interfere with effectiveness of soap and many disinfectants and medications administered via water
pH	<6	Poor: Performance problem, corrosion of water system
	6.0-6.4	Poor: Potential problems
	6.5-8.5	Satisfactory: Recommended for poultry
	>8.6	Unsatisfactory
Sulphates	50-200	Satisfactory: May have a laxative effect if Na or Mg >50ppm
	200-250	Maximum desirable level
	250-500	May have a laxative effect
	500-1000	Poor: Laxative effect but birds may adjust, may interfere with copper absorption, additive laxative effect with chlorides
	>1000	Unsatisfactory: Increases water intake and wet droppings, health hazard for the young birds
Chloride	250	Satisfactory: Highest desirable level, levels as low as 14ppm may cause problems if sodium is higher than 50ppm
	500	Maximum desirable level
	>500	Unsatisfactory: Laxative effect, wet droppings, reduces feed intake, increases water intake
Potassium	<300	Good: No problems
	>300	Satisfactory: Depends upon the alkalinity and pH
Magnesium	50-125	Satisfactory: If sulphate level >50ppm magnesium sulphate (laxative) will form
	>125	Laxative effect with intestinal irritation
	350	Maximum
Nitrate Nitrogen	10	Maximum (sometimes levels of 3mg/l will affect performance)
Nitrates	trace	Satisfactory
	>trace	Unsatisfactory: Health hazard (indicates organic material fecal contamination)
Iron	<0.3	Satisfactory
	>0.3	Unsatisfactory: Growth of iron bacteria (clogs water system and bad odor)
Fluoride	2	Maximum
	>40	Unsatisfactory: Causes soft bones
Bacterial Coliforms	0 cfu/ml	Ideal: Levels above indicates fecal contaminations
Calcium	600	Maximum level
Sodium	50-300	Satisfactory: Generally no problem, however may cause loose droppings if sulphates >50ppm or if chloride >14ppm

NOTE: 1ppm approximates to 1mg Courtesy of Dr Carlos Antonio Debortoli (2005)



Every attempt has been made to ensure the accuracy and relevance of the information presented. However, Aviagen Turkeys accepts no liability for the consequences of using the information for the management of turkeys.

For further information, please contact your local Aviagen Turkeys Manager.

Aviagen Turkeys Ltd

Chowley Five,
Chowley Oak Business Park,
Tattenhall, Cheshire, CH3 9GA

Tel: +44 (0)1829 772 020

Fax: +44 (0)1829 772 059

turkeysLtd@aviagen.com

www.aviagenturkeys.com

Nicholas



B.U.T.