



# SPESFEED NEWS

Summer Edition

February 2011

## General News

**2011 will prove to be an interesting year for animal agriculture. Our economy, although in better shape than it was in 2009/2010, is still wobbling along. The strong Rand may have made ingredients cheaper in the short term, but floods and political issues may well lead to a firming of prices later in the year. In addition, cheap imports, with no brine having been added, remain a threat.**

Maize farmers have been crying foul. As per usual, they are painting pictures of doom and gloom in the plateland, with a purported 10 000 farmers in financial difficulty.

The call of organised agriculture for farmers to plant less maize, and by so doing increase local prices, seems to have been headed in some quarters, with the Financial Mail reporting that 10% less maize will be planted this season than last. If yields continue to improve as they have been doing, planting may still give rise to a 4mil to 6 mil ton surplus, of which it is believed that we can probably only export 2 mil tons

In addition, Grain SA has formally approached the Competition Commission, to allow them to create an export pool for maize in an attempt to both control the size of this surplus, and the price that will be paid for maize locally. The Poultry Association has objected to this move in the strongest terms. This is now a moot point, because on the 11<sup>th</sup> of January the Competition Commission rejected the application on the grounds that it contravenes the country's competition act.

Attempting to manipulate commodity prices in a global market, where prices change rapidly, yields are variable and currencies are unpredictable, is probably a dangerous and/or futile exercise. At best, the only real change that could be hoped for, would be to effect a swing from export to import parity for maize, while at the same time putting food security in our region at risk.

Maize farmers should remember that the only way to guarantee a "misoees" is not to plant a crop at all, although they could "farm" on SAFEX as an alternative. Anyone in business knows that reducing volumes (in this case hectares planted) will lead to an increase in the production cost for each ton of maize that is sold. Therefore, unless it is only marginal land that is withdrawn from production, cutting back may be exactly the wrong thing to do.

This edition of SPESFEED news has many little snippets in it, rather than a few longer articles. I trust that you will enjoy the variety that it presents.

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## Newsletter Survey

During the last quarter of 2010 we decided to run a survey amongst our readers. I tried to use a free on-line tool to do this but it caused more problems than it was worth. Never the less 41 people took the time to respond – all of who wished to continue receiving the newsletter! A few interesting points have come up from the survey:

- Without exception, everyone would like to receive the newsletter by email, and very few ever access the website.
- Whilst we are flattered to be asked to produce more issues each year, even producing three issues a year is a challenge.
- Most people (over 90%) found the letter easy to read and read the entire thing. A few people commented that it was hard to read online. One suggestion was that the column format is the cause of this and that it should look more like a web page. This is fair comment. We have had a look at a different format, and if we set the document up to look like a web page it prints funny and is difficult to read
- The vast majority of people felt that the newsletter is professional, scientific and up to date. A few people asked for more information on pigs and even fewer for more on ruminants. About a third of readers felt they would like more industry news.
- Many respondents felt that the newsletter was more valuable to them than other popular publications, although one respondent felt that the different publications were complimentary, and I feel that this sums up the situation best.
- Most people retain their back issues and most readers pass it on to other people. This is rewarding to hear.
- Interestingly, the majority of readers who responded on the issue felt that we should carry advertising. One reader commented that carrying adverts in the newsletter was a business decision but that it would be sad if we had to resort to this. This comment pretty much sums up our feeling on the issue and we will endeavour not to have to run adverts.

## Courses

In September, we held the most successful poultry and pig nutrition courses that we have ever had, with nearly 40 people doing the poultry course and a further 25 or so doing the pig course. As always, the Country Club, Johannesburg was a comfortable and organised venue.

The 2011 poultry nutrition course will be held from the 12<sup>th</sup> to the 14<sup>th</sup> of September.



This year we plan to hold a **“Broiler Nutrition Master Class”** in conjunction with Steve Leeson. Here we will cover those issues that I would always like to deal with in more detail in the normal course. Some of the topics we will deal with in more detail are:

- Should we be applying different feeding strategies to different strains of broilers?
- Evaluating the profitability of broiler feeding.
- Early broiler nutrition- pre-starters, digestion vs. indigestion
- Optimum use of C<sub>2</sub>-C<sub>22</sub> fatty acids- organic acids and AGP's to energy supply
- Alternative ingredients- they don't exist!
- Effective anti-coccidial programs.
- What should be included in a Vitamin and Mineral premix and what levels should we use.
- Selecting and using enzymes for broiler feeds.
- Feed additives- too many exist!

We plan to run the event during the later part of October, but will confirm the dates and costs nearer the time.

Should you be interested in either event, please contact [rick@spesfeed.co.za](mailto:rick@spesfeed.co.za) or [blosper@afrosoft.biz](mailto:blosper@afrosoft.biz).

## New Technologies

I have become aware of a new paint product called PC 200 that can be applied to the roofs of buildings as a thermal insulator. Tests have shown that inside temperatures drop by 15 to 20 degrees. A 1 mm layer of PC 200 has the same insulating properties as 100 mm of foam concrete. If you are interested in this new innovation please contact Derek Joustra on 079 2422 922.

Another technology that I have just become aware of is a novel way of hatching and brooding chicks, called the HatchBrood system ([www.hatchbrood.nl](http://www.hatchbrood.nl)). As you will be aware, early access to feed is essential for the development of the GIT of young chicks. In addition, chicks require an optimal body temperature (in excess of 40° C), at which temperature metabolic processes, growth and development are optimised. After 4-5 days, the bird makes the transition to a complete homoeothermic animal. The rate of this transformation depends on factors such as chick size (with smaller birds taking longer). Sub-optimal and non-uniform temperatures lead to delayed start-ups, reduced performance and non-uniform flocks. The HatchBrood system has been developed to ensure that newly hatched chicks not only have early access to feed and water, but also find themselves in an environment where the temperature, air speed, relative humidity and gaseous levels are controlled. Chicks are transferred to the HatchBrood system at hatching and remain in the hatchery for a further 4 to 5 days. As a comment, this system appears not to address the issue of a spread of hatching ages, which means that some of the birds will still be without food for a couple of days. Sadly, no data is presented on the economic benefits of using the system.

## Website

We have finally had our website rebuilt professionally. Jenny Flanagan of Breezehill Interactive, who designed the Avi-Products web site for us ([www.aviproducts.co.za](http://www.aviproducts.co.za)) has built us a site that we feel is a clean, fast and easy to find what you want. The idea of our website is that it should

serve only as a storage space for the information that we publish. In addition, it is possible to download the latest version of [SPESFEED EXPRESS](#) from the website.

## Windows 7 – 64 bit

This just serves a brief warning to **SPESFEED EXPRESS** users. The program will run perfectly in Microsoft's 64-bit environment. When you transfer your data on to your new machine, the underlying SQL system automatically updates the file structure to run on the new version. What is the problem you ask? Simply this, once you have run data in the 64 bit environment you cannot go back to another machine and run it in a 32-bit environment. Microsoft's error message is "This is not backwards compatible". Be warned – many of the new machines being sold today are being shipped with the 64-bit operating system pre-installed.

## Recruitment

Those of you, who have dealt with SPESFEED in the past, will know that we have been involved in the recruitment of agricultural professionals for many years. This has always been on an informal basis and we have managed to find many jobs for individuals and fill any number of positions for companies. The problem with doing this on an *ad hoc* basis is that we do not have the correct systems in place to make a proper job of it.

To this end, we have come to an agreement with Brian Hewitt of Hewitt Colenbrander Recruitment ([www.hcrecruit.co.za](http://www.hcrecruit.co.za)). Brian is an agriculturalist with many years of farming and commercial experience and he has a good understanding of agribusiness.

Hewitt Colenbrander will handle the more formal side of recruitment on our behalf. This would include aspects such as background checks on the candidates, ensuring that the "best fit" between employee and employer is achieved and the maintenance of an effective database of candidates and positions. Please feel free to let us know about your career aspirations, or if you are an employer about your succession planning goals.

## Remote Access

We have just purchased a user licence for the Techinline Remote Desktop system. This allows us

(and the client) to use/fix each other's PC's over the internet. Security is strong, and no activity can occur without both parties using the correct password and accepting the intervention from another machine. I have been able to work on both Format and SPESFEED EXPRESS remotely. The drawback of this, or any similar system for that matter, will be line speed. The faster the better.

This technology will improve our service levels and prevent those long journeys to fix something small. All we have to do is to remember to use it.

## Poultry Veterinarians

As nutritionists, we work closely with our colleagues the veterinarians. They provide critical support to nutritionists and producers. Changes have occurred amongst this small group of professionals that you should be aware of. Dr Shahn Bisschop has left the Poultry Reference Laboratory at Onderstepoort and has moved to Avimune to become a full time veterinary consultant. Dr Peter Smith will run the OP lab for the moment. Shahn has been at OP for 12 years and has done sterling work both in the lab and in teaching students. His inputs at the University will be missed.

The second development is that Dr Chris Henderson and Prof Neil Duncan, assisted by Dr Dirk Greyling have set up a new consulting body called C4 Africa Professional Consultants. They plan to service clients not only in poultry but all intensive animal production units within the Southern African region. Contact Chris via e mail; [chickipc@global.co.za](mailto:chickipc@global.co.za) or call + 27 83 659 3603

Lastly, Dr's Herman Bosman and Jan Wicht have joined forces and formed The Poultry Practice. Although based in the Cape, they will be undertaking work anywhere in Southern Africa. They can be contacted via their website at [www.thepoultrypractice.com](http://www.thepoultrypractice.com).

## Organic Food

There are suggestions in the literature that birds and mammals prefer organic food to conventional products. A study carried out by Alisa McKenzie and Mark Whittingham of Newcastle University, showed

this not to be the case. Both captive birds in the laboratory and wild garden birds consumed more conventional than organic wheat when given free choice. There was a lag in preference formation during which time birds learnt to distinguish between the two food types, which may explain why findings differ from other studies. It was shown that the causal factor for this was the higher protein content of the conventional seed.

## Strain Differences

In the last edition of SPESFEED News we discussed the differences between broilers strains. In recent work, it has been shown that there are distinct genetic differences between individuals' ability to digest wheat for example. De Verdal *et al.*, (2010) have shown that the heritability for a broilers ability to digest wheat is high at 0.35. This is less pronounced in maize, which only has a heritability of 0.1. By apply selection to individuals, the INRA institute has been able to produce two strains of birds with different abilities to utilise their diet. The D+ strain utilise their feed effectively than the D- strain. The different strains differed in the development of their gastro intestinal tracts.

**Table: The Difference between broilers selected for their ability to digest wheat (D+) and those that are poor digesters of wheat (D-) in performance and gut morphology. After de Verdal *et al.*, (2010).**

	D+	D-
Weight 23 days (g)	490	428
Intake (g)	724	940
FCR	1.715	2.718
Proventriculus (g)	8.2	6.7
Gizzard (g)	26.0	19.4
Duodenum (g)	12.7	14.6

## Oyster Mushrooms

I am sure that you are wondering why I am writing about mushrooms in a nutrition newsletter. Read on! I was amazed to learn that a new research facility for Oyster Mushrooms has opened at Cedara – costing R 42 mil. The Zulu King is involved in the project, so there is some political will behind the project, but why we can't spend some money on poultry research beggars' belief. The poultry industry in South Africa's single largest agricultural entity (bigger than maize), yet I do not think the state has built a new test house for 30 years (and it would nothing like a mushroom house).

## Poultry Production in Africa and Oceania

An article on [www.thepoultrysite.com](http://www.thepoultrysite.com) discussed poultry production Africa and Oceania. I will not repeat it here, but would like to show some of the data which was sourced from the FAO. All figures are in thousands of tons of eviscerated product.

It needs to be pointed out that the figures quoted for South African production are lower than the figures published by the South African Poultry Association, who estimate that 1.8 mil tons will be produced this year. These differences may well be ascribed to the addition of flavour enhancing brine to South African poultry products (the now infamous Botox Chickens). I should also point out that the data for some of our neighbouring countries looks to be incorrect. There has been appreciable growth in Botswana, Swaziland and Zambia over the last decade. Zimbabwe on the other hand will have produced more than 25 000 tons of chicken in 2000, and it is difficult to know how big that industry is currently, as it is beset with chick and feed supply problems.

What was of interest to me though is that the Australian industry is 30% smaller than ours is, yet I would imagine that state support for research is hundreds of fold greater than what we get – see Oyster mushrooms.

	2000	2004	2006	2008	2010 forecast	Increase (%)
Algeria	240	253	253	253	251	5
Botswana	8.8	6	5	6	6	-68
Egypt	513	560	560	560	633	23
Libya	98	99	99	100	105	7
Malawi	15.3	15.8	15.3	15.3	15.5	1.5
Mauritius	21	33	36.2	42.2	42.5	202
Morocco	250	325	370	440	502	200
Mozambique	31	31	40	36	36	16
Nigeria	160	211	232	243	250	156
South Africa	816	900	971	974	1424	159
Swaziland	4	7	5	5	5	25
Tunisia	87	96	79	103	107	123
Zambia	35	39	37	37	37	6
Zimbabwe	25	46	40	37	35	140
Australia	610	694	760	812	890	145
New Zealand	105	147	149	146	151	144

## Mixer Tests

Testing how well a mixer works is something we often do. There are many different ways of doing this. You can take 8 or 10 samples from a single batch of feed and then test them for something such as protein or sodium. Some simple statistics (carried out by Excel is the easiest) will quickly give you an indication of how accurate your mix is.

Another option is to use a metallic tracers, which are recovered and the distribution determined.

Buckmaster, at the recent California Nutrition Conference, proposed a far simpler method. He has proposed that dairy farmers simply add 2 kg's of whole maize to the mixer. Samples of a standard size are then drawn and the numbers of intact kernels are counted. If you are concerned that some maize is escaping the milling process, white maize could be used instead. For that reason, I cannot see why whole wheat could be used either. Buckmaster suggest using marshmallows! Once you have a "count" for each sample, you can conduct your statistical analysis.

## Feed Form and Broilers

In a paper in the Journal of Applied Poultry Research (Vol 19: 219-226) Dozier and his co-workers looked at the benefits of, and costs associated with feeding different forms of feed to broilers. Ross 708 broilers were used. All diets were identical in terms of formulation and nutrient content. A standard Starter crumble was fed for 2 weeks, at which point one of four experimental diets was offered. These were good quality pellets, low quality pellets, good pellets to which 20 % and 30% of the formulated maize was added back to the grower and finisher diets post pelleting and a mash using produced using a roller mill. The results are summarised in the table below.

**Table: Growth and performance of Ross 708 male broilers fed diets differing in feed form from 1-42 days of age.**

	Revised PDI	Weight (g)	FCR	Mortality (%)
Good Pellets	85.5	3.167 <sup>a</sup>	1.712 <sup>ab</sup>	2.0
Poor Pellets	52.5	3.093 <sup>ab</sup>	1.694 <sup>b</sup>	1.3
Added Maize	87.0	3.141 <sup>a</sup>	1.715 <sup>a</sup>	1.6
Mash	-	3.053 <sup>b</sup>	1.695 <sup>b</sup>	1.5

Despite the fact that the experiment was conducted at stocking density only 14 birds/ m<sup>2</sup>, there were significant differences between treatments. Interestingly the results achieved on the mixture of rolled maize and pellets were the same as those achieved on good pellets. When one considers that pelleting costs range from US\$ 4 – 6 per ton (about R 80/ton in South Africa), this may represent an opportunity for producers.

**Rick Kleyn**

# Dietary Amino Acid Levels for the Cobb 500.

Deciding on the amino acid content and feeding regime to be used for a broilers is perhaps the most difficult aspect of a nutritionist's job. The results from test house trials are often not relevant to the commercial conditions under which we operate. Even more important, is the manner in which we analyse the data that we do have from an economic perspective. If, as a nutritionist you focus on the cost of production, rather than maximizing returns, you are selling both yourself and your client short.

Alex Corzon and his colleagues from the Department of Poultry Science at the University of Mississippi have just published a paper in the Journal of Applied Poultry Research (Vol 19: 227-236) in which they offered male Cobb 500 broilers a number of different feeding regimes. Three amino acid levels were used. These were high, moderate, or low in terms of their dietary amino acid content. Starter was fed from 0-14 days as a crumble, grower from 14 to 28 d and finisher from 28 to 42 d. Both the Grower and Finisher diets were fed as pellets. Different phase programs, giving rise to 17 possible treatment combinations were used.

The diets that have been used are summarised in the table below. Note that no Crude Protein minimum was used (which may well be a shortcoming in the light of what is known about the Lysine: Protein ratio). The Cobb recommendations [www.cobb-vantress.com](http://www.cobb-vantress.com) have been included in the table for interest sake.

The feeding regimes that were used, together with a summary of the 42 day results obtained can be seen in table 2. Differences in body weight and FCR were significant, but surprisingly differences in breast weight were not. I have taken the liberty of adding summary data (marked in blue) for each of the different starter diets that were used.

**Table 1: The specifications of the diets used in the experiment, together with Cobb recommendations.**

	High (H)	Mod (M)	Low (L)	Cobb Manual
<b>Starter Crumbles (0-14 days)</b>				
ME (MJ/kg)	13.0	13.0	13.0	12.5
Protein (g/kg)	23.4	21.8	20.5	21.0
Lys (g/kg)	12.5	11.6	10.7	10.8
TSAA (g/kg)	9.7	9.1	8.3	8.0
Cost US\$/ton	240.80	231.20	222.1	
<b>Grower Pellets (14 – 28 days)</b>				
ME (MJ/kg)	13.1	13.1	13.1	12.9
Protein (g/kg)	21.4	19.8	18.4	19.0
Lys (g/kg)	11.2	10.3	9.5	9.9
TSAA (g/kg)	8.8	8.0	7.3	7.5
Cost US\$/ton	228.30	218.10	209.60	
<b>Finisher Pellets (28-424 days)</b>				
ME (MJ/kg)	13.2	13.2	13.2	13.3
Protein (g/kg)	20.0	18.7	17.3	18.0
Lys (g/kg)	10.5	9.7	8.8	9.5
TSAA (g/kg)	8.2	7.5	6.8	7.4
Cost US\$/ton	220.30	211.50	202.80	

It was concluded that body weight gain and feed conversion were improved when broilers were fed the H diets throughout their lives, but mortality and BW uniformity remained unaltered. Carcass yield was unaffected by dietary treatments, while breast meat yield was maximized in birds fed the H diets. Abdominal fat percentage was increased in birds fed the L diets. From an economic perspective, the benefits observed when feeding high amino acid density diets, were not necessarily the most economical. The Cobb 500 male showed an ability to respond to increasing amino acid density as the bird aged, but any beneficial effects of feeding high amino acid density diets early in life may not be warranted for this strain.

I am afraid that these data, the conclusions that were drawn, and the economic interpretation of the results have raised more questions than answers to my mind.

Let's start by looking at the impact of the different starter diets. I have taken the liberty of summarising the data in table 3, as this was not done in the original paper.

**Table 2: A summary of the performance achieved on the different feeding regimes, together with the estimated feeding costs for different products.**

	Body Weight (g)	FCR	Carcass Weight (g)	Breast (g)	Feed Cost (US\$/kg)		
					Body Weight	Carcass	Breast Meat
HHH	2665 <sup>ab</sup>	1.63 <sup>fg</sup>	1957	649	0.367	0.514	1.528
HHM	2719 <sup>a</sup>	1.64 <sup>ef</sup>	1903	630	0.361	0.514	1.568
HHL	2688 <sup>ab</sup>	1.69 <sup>b</sup>	1936	635	0.364	0.514	1.568
HMM	2609 <sup>bcde</sup>	1.68 <sup>b</sup>	1895	615	0.363	0.508	1.572
HML	2545 <sup>def</sup>	1.72 <sup>a</sup>	1841	578	0.364	0.513	1.593
HLL	2531 <sup>ef</sup>	1.73 <sup>a</sup>	1836	575	0.362	0.504	1.575
	2626	1.68	1895	614	0.364	0.511	1.567
MHH	2668 <sup>ab</sup>	1.61 <sup>gh</sup>	1893	621	0.362	0.510	1.533
MMH	2644 <sup>abcd</sup>	1.64 <sup>ef</sup>	1877	610	0.364	0.509	1.570
MMM	2613 <sup>abcde</sup>	1.66 <sup>cdc</sup>	1868	601	0.357	0.493	1.536
MML	2523 <sup>cd</sup>	1.72 <sup>a</sup>	1781	558	0.363	0.519	1.624
MLL	2552 <sup>odef</sup>	1.73 <sup>a</sup>	1820	570	0.358	0.501	1.590
	2600	1.67	1848	592	0.361	0.506	1.571
LHH	2660 <sup>abc</sup>	1.60 <sup>b</sup>	1882	612	0.357	0.500	1.538
LMH	2522 <sup>ef</sup>	1.63 <sup>fg</sup>	1823	582	0.359	0.496	1.556
LLH	2495 <sup>f</sup>	1.65 <sup>def</sup>	1833	574	0.357	0.496	1.566
LMM	2555 <sup>odef</sup>	1.66 <sup>cd</sup>	1828	590	0.357	0.505	1.575
LLM	2465 <sup>fg</sup>	1.67 <sup>bc</sup>	1755	554	0.355	0.498	1.581
LLL	2381 <sup>g</sup>	1.72 <sup>a</sup>	1755	537	0.356	0.488	1.583
	2513	1.66	1813	575	0.357	0.497	1.567

Unfortunately, it is not possible to carry out any form of statistical analysis when a data summary of this nature is made. This table shows the impact of feeding higher protein starter diets. It has a lasting benefit throughout the production cycle of the broiler. This confirms the work of Lemme reported on in the last edition of SPESFEED News.

**Table 3: A summary of the data showing the impact of feeding High, Moderate and Low Starter diets from 1 to 42 days.**

	14 Days		28 Days		42 Days	
	Weight (g)	FCR	Weight (g)	FCR	Weight (g)	FCR
H	345 <sup>a</sup>	1.11 <sup>a</sup>	1374	1.41	2609	1.63
M	329 <sup>b</sup>	1.14 <sup>b</sup>	1321	1.47	2592	1.66
L	311 <sup>c</sup>	1.18 <sup>c</sup>	1272	1.52	2537	1.72

It should be pointed out at this stage that this experiment was conducted with 11 birds in a 1m<sup>2</sup> pen – which effectively means feed intake is unlimited. I would suspect that if these diets were to have been used in a commercial situation with double the stocking density, the results between the High and Low starter diets may be greater than shown here.

The real issue that I have with this paper is the economic analysis. The authors have calculated a feed cost per kg of product - and not a return per bird. Lemme and Fickler, writing in All About Feed (Vol 1:2, 2010) make the point that when evaluating a feeding program, the margin of feed should be considered when doing an economic appraisal of a feeding system, and not a simple evaluation of the feed cost per kg of chicken produced. Margin over feed not only considers the efficiency of growth but also the value associated with that growth. Because this crucial step has been missed, the authors may have misinterpreted their own data. I have been supplied with current prices of US\$ 1.83/kg for live birds and US\$ 2.80/kg of carcass by Steve Leeson. In addition, I have created a “Processed Carcass” category, where I have added 15% flavour enhancer to the product. Using these values, I have been able to create an income from which the feed costs can be subtracted. By doing this, I am able to clearly show that the high protein diets are indeed those that make the most money (Table 4).

If you are a broiler producer, you may be tempted to feed a “Moderate” finisher, as on the face of it, this feeding regime would result in the greatest return. I would urge caution in this regard, because although the weight achieved on this feeding regime was the highest, it needs to be remembered that this may be an anomaly as it is not significantly different from the weight achieved on the “Higher” finisher. The same could be said about the carcass weight on the HHH treatment.

This issue goes further. Cobb, recommend a Starter specification which could only be classed as “Low” in this context. The Grower and Finisher recommendations that are made are marginally higher, but for the purposes of this discussion, let us assume that they are “Moderate”. This means that if you follow the Cobb recommendation, even with the low stocking density used in this experiment, as an integrator, you could lose between 30 and 40 US cents per bird processed. All of my calculations ignore the fact that the more meat that goes through the processing plant, the more efficient it is too. Producing light birds makes little sense, unless of course the market demands a smaller bird.

**Table 4: A summary of the performance achieved on the different feeding regimes, together with the estimated return per bird for the different feeding regimes.**

	Body Weight (g)	Carcass Weight (g)	Feed Costs (US\$/bird)	Return (US\$/bird)		
				Farm Gate	Whole Carcass	Processed Carcass
HHH	2665 <sup>ab</sup>	1957	0.978	3.90	4.50	5.32
HHM	2719 <sup>a</sup>	1903	0.982	3.99	4.35	5.15
HHL	2688 <sup>ab</sup>	1936	0.978	3.94	4.44	5.26
HMM	2609 <sup>bcde</sup>	1895	0.947	3.83	4.36	5.15
HML	2545 <sup>def</sup>	1841	0.926	3.73	4.23	5.00
HLL	2531 <sup>ef</sup>	1836	0.916	3.72	4.22	5.00
	2626	1895	0.955	3.85	4.35	5.15
MHH	2668 <sup>ab</sup>	1893	0.966	3.92	4.33	5.13
MMH	2644 <sup>abcd</sup>	1877	0.962	3.88	4.29	5.08
MMM	2613 <sup>abcde</sup>	1868	0.933	3.85	4.30	5.08
MML	2523 <sup>cd</sup>	1781	0.916	3.70	4.07	4.82
MLL	2552 <sup>odef</sup>	1820	0.914	3.76	4.18	4.95
	2600	1848	0.938	3.82	4.24	5.01
LHH	2660 <sup>abc</sup>	1882	0.950	3.92	4.32	5.11
LMH	2522 <sup>ef</sup>	1823	0.905	3.71	4.20	4.96
LLH	2495 <sup>f</sup>	1833	0.891	3.68	4.24	5.01
LMM	2559 <sup>odef</sup>	1828	0.912	3.76	4.21	4.97
LLM	2465 <sup>fg</sup>	1755	0.875	3.64	4.04	4.78
LLL	2381 <sup>g</sup>	1755	0.848	3.51	4.07	4.80
	2513	1813	0.897	3.70	4.18	4.94

This issue goes a little further. Cobb, recommend a Starter specification which could only be classed as “Low” in this context. The Grower and Finisher recommendations that are made are only marginally higher, but for the purposes of this discussion, let us assume that they are “Moderate” specifications. This means that if you follow the Cobb recommendation, even in a non-limiting environment such as existed in this experiment, as an integrator you could lose between 30 and 40 US cents per bird processed. Experience has shown that where feed intakes are limited by stocking pressure, birds on higher density diets perform better.

**Rick Kleyn**

### **SPESFEED (Pty) Ltd.**

#### **Animal Nutrition Consultants**

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