SPESFEED NEWS

Summer Edition — February 2010

General News

Welcome to the first edition of the SPESFEED News for 2010, a year that promises to be interesting for South Africa. The hoards of football fans who are about to descend on our shores are expected to eat and drink us out of house and home. I have heard talk that it will be like adding a thirteenth month to the calendar in terms of demand. If beer consumption by British Lions supporters last year was anything to go by, then this prediction may not be too far wrong. I for one am laying in some stock, but I wonder how the catering industry is going to deal with shortages of chicken, meat and beer.

When I started working on this edition, I was concerned that I had not found enough material to make it interesting. This has not been the case, as we have had a chance to examine some recent publications in depth and interpret the findings made by the authors. Although there is a fair amount of information to do with the amino acid levels we feed our animals, I would like to touch on organic poultry production (yet again). A few things have revived my interest in this particular topic.

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Nutrition Courses

Following the successful Dairy Nutrition Course we held last year, we have planned to run another course this year from the 13th to the 15th of September. Note that we have made the course a 3-day event rather than the 2-day program that we followed last year.

We will be holding our annual Poultry Nutrition course from 20th to the 22nd of September. In addition, we will hold a Pig Nutrition Course on the 23rd of September if there is sufficient interest in such an event.

All events will take place at a venue at the Country Club, Woodmead. Should you require more information about the courses, or if you would like to attend, please send an email to rick@spesfeed.co.za

AFMA Forum

I would like to remind you all about the AFAM Forum next month. The program looks to be varied and interesting and I am sure that there will be something of interest for everyone.

Antibiotic Sales in the Netherlands

The Netherlands Minister for Agriculture, Ms Gerda Verburg, wants to investigate whether the sale of animal drugs by veterinarians must be banned in the Netherlands. The goal is to reduce the risk of antibiotic resistance in bacteria. In Denmark such a measure (as part of a package of measures) seems to have led to a significant reduction in administration of antibiotics in livestock.

According to Verburg, the high antibiotic use in the Dutch livestock sector may be linked back to the fact that vets earn money by selling the antibiotics. Verburg advocates minimising the use of (therapeutic) antibiotics in the livestock sector because it may result in antibiotic resistant bacteria in humans.

The ban on antibiotic growth promoters has led to a reduced use of antibiotics on farms. Antibiotics are now only used a therapeutic measure and can only be subscribed by a veterinarian. On average, a pig in the Netherlands receives 32 doses of antibiotics per year. Denmark supplies 9 doses per pig per year. In the Netherlands, antibiotics are often given to a whole animal group, even when only one animal in that group is ill.

The Dutch organisation of veterinarians (KNMvD) admits that the use of antibiotics in livestock needs to be reduced drastically and soon. However, a ban on the sale of antibiotics by veterinarians is not seen as effective. Better feed quality, strict hygiene in barns, proper management and improved vaccination policies will have effect, says the KNMvD. Also the registration system needs to be improved to incorporate more data than the current systems.

Organic Poultry

A number of issues have prompted me to revisit the issue of organic food in general and organic poultry in particular.

Firstly, the Bryanston Organic market in Sandton (probably the largest organic market in the country) has decided that the standards for organic production are too stringent, so they are going to introduce their own, watered down version (Farmers Weekly). Secondly, Woolworths who have pioneered the "alternative" market, are about to embark on what they call the "Farming for the Future" program. It is to be a combination of organic farming principles, and the best modern science has to offer – in essence, it will be their own version of Organic Lite. Lastly, my local butcher insists on trying to sell me organic chicken, and I know that there are no truly organic broilers produced in this country.

The reality is, that the rest of the world have stringent sets of regulations for a product to qualify as "Organic". In South Africa, we feel that we are entitled to move the goal posts as it suits us, and simply create our own set of standards. Even more disturbing is the fact that anyone can call their product "Organic" and put it on a shelf without any fear of recourse.

As I have shown in previous editions of SPESFEED News, producing organic food is not only expensive (more than twice the price) but also produces a larger carbon footprint than conventional poultry production. Perhaps South African consumers are not yet ready to pay the premiums associated with organic food

In the most recent edition of the Journal of Applied Poultry Research (Vol18:795-802), Crandall and his team from Arkansas have produced a review article that deals with customer perceptions, opportunities and regulatory issues of organic poultry. In the light of my comments in the introduction, I have included a summary of some of this article for your interest.

Organic and all-natural foods have become an alternative in most mainstream retail food outlets. Organic foods, although only 3% of total retail food sales, account for an estimated $17 billion in sales in the United States, and this category has been growing at a rate 7 times faster than the average food category, maintaining a sustained growth rate of more than 15% per year. Organic meat is the fastest growing sector of the organic market, and organic poultry is considered a gateway food, drawing in consumers who are just beginning to purchase organic foods. Current organic consumers are a bimodal population consisting of one group in their 20s and a second composed of aging baby boomers.

One of the principal beliefs is that organic foods are safer than conventional foods. Many consumers base this belief in the safety of organic foods on the prohibition of pesticides and chemicals in raising the organic food. However, their understanding of the risks from pathogenic microorganisms on organic foods is not clear.

In the US, the Organic Foods Production Act of 1990, provides a clear definition of what constitutes organic foods and what production, processing, and handling requirements are mandated. Both production and processing facilities are subjected to third-party audits for compliance with every aspect of the organic plan annually. The USDA organic seal can be used only on organic foods whose production systems have been inspected and approved by third-party certifying agencies and who comply with the regulatory requirements.

The bottom line though is simple. A product is either organic in the true sense of the word, or not. There should be no self-determined half measures. Lastly, if it is sold as "organic" then I jolly well expect it to be the real thing.

Feeding Layer Pullets

All those of you who are involved in the feeding of layer pullets will know that the major challenge of pullet rearing is to achieve the correct weight for age with acceptable uniformity. M. Frikha and co-workers, from the Departamento de Producción Animal, Universidad Politécnica de Madrid, have just published a paper in Animal Feed Science and Technology (Vol 153: 292-302), which deals with feeding of diets of different energy density in either pellet or meal form. Three different dietary regimes were used, as shown in Table 1. During the Starter phase the diets were fed either as a pellet or as a meal, where after all birds were fed mash diets. Hy-Line Brown pullets were used in the experiment.

Table 1: The energy levels (MJ/kg) used in the experiment.

Days	Low Energy Diets (LED)	Medium Energy Diets (LED	High Energy Diets (LED
1-45	11.44	12.05	12.65
46-85	11.13	11.72	12.30
85-120	10.97	11.55	12.13

Table 2: Influence of energy level and feed form of the diet on the performance of pullets.

Treatment	1-45 days			1-120 days		
	BWG	ADFI	FCR	BWG	ADFI	FCR
Feed						
LED	10.5^{b}	27.8^{a}	2.65^{a}	11.8^{c}	56.3^{a}	4.77^{a}
MED	10.8^{a}	27.5^{a}	2.54^{b}	12.1^{b}	54.5^{b}	4.51^{b}
HED	10.9^{a}	26.5^{b}	2.44^{c}	12.3^{a}	$52,2^{c}$	4.23^{c}
Form						
Mash	10.6	26.9	2.55	12.0	53.9	4.50
Pellets	10.9	27.7	2.54	12.2	54.8	4.51

(a–c) Mean values within a column and main effects not sharing a common superscript are different ($P<0.05$).

The growth performance of the birds is shown in table 2. Diet and dietary form had no significant impact on the uniformity of the flocks. However, diet had an impact on the development of the digestive tract as can be seen from table 3.

Table 3: Influence of energy level and feed form of the diet on the relative weight and relative length of the gastrointestinal tract in pullets at 45 days of age.

Treatment	Relative Weight (g/kg BW)			Relative Length (cm/kg BW)		
	Diges-tive Tract	ADFI	Gizz-ard	Duod-enum	Ileum	Small Intestine
Feed						
LED	144.1^{a}	6.2^{ab}	36.7^{a}	41.3	94.4	248.7
MED	138.9^{a}	6.3^{a}	35.5^{a}	40.6	91.5	242.8
HED	129.2^{b}	5.8^{b}	28.9^{b}	39.8	90.0	238.2
Form						
Mash	146.7	6.3	39.9	39.9	94.8	249.3
Pellets	128.0	5.9	27.4	27.4	89.1	237.2

(a–c) Mean values within a column and main effects not sharing a common superscript are different ($P<0.05$).

By 120 days of age, only the Gizzard was significantly larger when fed the LED.

It was concluded that an increase in the energy content of the diet of Hy-Line Brown pullets improved pullet performance at all ages but had no effects on uniformity. Feeding pellets from 1 to 45 d of age improved gain and feed intake at this age but FCR was not affected. The beneficial effects of feeding pellets from 1 to 45 d of age on body weight were maintained at 120 d of age.

Increasing the energy density or pelleting of the diet fed from 1 to 45 d of age, reduced the relative weight of the gizzard at 120 d of age, a finding that has to be taken into account in pullet rearing because a poor development of the gizzard might affect productive performance at the onset of the egg-laying period.

Fibre in Broiler Diets

Last year we carried an article about the benefits of feeding fibre to laying hens. A recent publication by Jiménez-Moreno and co-workers of the Departamento de Producción Animal, Universidad Politécnica de Madrid, deals with the effects of source of fibre on the development and pH of the gastrointestinal tract of broilers. The introduction to the paper sets the scene extremely well, and I have included a précis of it and the final results of the trial for your interest.

Enteric disorders are a major problem in broiler production. The inclusion of whole grains, the utilization of coarse particle diets and supplementation of the diet with enzymes are some of the nutritional strategies recommended to minimize the growth of pathogens and to improve performance of broilers fed diets without in-feed antibiotics. A disruption of the equilibrium of the commensal microbiota because of changes in the composition of the diet may result in changes in the structure of the mucosa of the gastrointestinal tract (GIT) leading to diarrhoea and poor chick performance.

Dietary fibre is an important component of poultry diets. The inclusion of fibre increases the retention time of the digesta in the upper part of the digestive tract (from crop to gizzard) and stimulates gizzard function and the production of HCl in the proventriculus. In addition, a low pH in the upper GIT improves the solubility and absorption of minerals and improves pepsin activity.

Very little scientific literature exists that examines the effect of the physico-chemical properties of the fibre source on the development of the GIT of broilers. There is some evidence that feed structure, a characteristic of the diet that is related to the plant material used, might affect the prevalence of *Salmonella* spp. and other pathogens in chickens. The amount and type of fibre might play an important role in this respect. Insoluble fibre sources, such as oat hulls (OH), stimulate gizzard activity and reduce gizzard pH and the length of the GIT as compared to soluble fibre sources. In contrast, soluble fibre sources, such as viscous polysaccharides from cereal grains, increase intestinal viscosity and microbial activity that is associated with hypertrophy of the GIT and reduced nutrient digestibility and broiler performance. The high water holding capacity and swelling capacity of fibre sources rich in pectin, such as sugar beet pulp, increases digesta viscosity and the bulk of the digesta when included in poultry diets. These effects favour the distension of the small intestine and indirectly, reduce feed consumption and bird growth.

The experiment carried out by Jiménez-Moreno set out to evaluate the effects of adding fibre sources differing in their physico-chemical characteristics to a low fibre diet on the development and digesta pH of the different segments of the GIT in 25-day-old broilers.

The response of the GIT to fibre inclusion varied according to the fibre source tested. The inclusion of moderate amounts of sugar beet pulp and oat hulls increased gizzard activity and reduced the pH of the upper part of the GIT, with no effect on the pH of the duodenum. The beneficial effects of oat hull inclusion on digesta pH and gizzard weight might be related to the larger particle size of the material and its resistance to grinding. In contrast, the effects of sugar beet pulp were probably related to its high water holding and swelling capacity. The inclusion of microcrystalline cellulose did not change any of the digestive traits studied in any segment of the GIT probably because of lack of physical structure of the source used.

This work raises more questions than it gives answers. The performance achieved by the birds was not measured for example. Where do Sunflower hulls (as a part of Sunflower oilcake) fit into the picture? Sunflower contains less NDF than either sugar beet or oat hulls. I look forward to seeing more work in this field.

Rick Kleyn

Amino Acid Levels in Layer Diets

Despite the fact that new, higher amino acid recommendations have been published for laying hens diets, I am not convinced that they will lead to improved production, let alone be more cost effective. Increasing amino acid levels without increasing energy levels (causing a reduction in feed intake) is simply going to cost producers more to feed their birds each day.

Recent articles by Bregendahl et al., (Poultry Science, 2008, Vol 87: 744-758) and Dr Andreas Lemme and his co-workers from Evonik – Degussa (2009) on the amino acid recommendations for laying hens has set me thinking about this whole issue afresh.

Lemme makes the point that as egg output (mass of egg) increases, with a concomitant decline in body weight, so to should the amino acids that we include in our diets. Methionine is considered to be the first limiting amino acid in most formulations, (which is not true for Southern

Africa where our diets are based largely on maize and sunflower). Thus they carried out a meta-analysis (combine the data of all experiments and analysed them as one) of nineteen experiments dealing with methionine response in laying hens. Egg mass (grams of egg per day) was regressed against digestible Methionine. Most of the experiments were conducted on hens aged between 24 and 39 weeks of age and a variety of different strains were used.

In the remainder of this article I will refer to each amino acid by its abbreviated name only, but please remember that we are talking about digestible values at all times.

When egg mass/hen/day was plotted against the dietary Met content of the diet, a very poor fit (r^2=.24) was obtained. This was ascribed to differences in feed intake caused by strain, management or other factors.

The best fit (r^2=0.775) was obtained by regressing daily egg mass data against daily Met intake per MJ of ME. The conclusion was that 36.15 mg Met intake/MJ ME per hen/day is optima (95% of asymptotic response). Similarly, a value of 65.76 mg TSAA intake/MJ ME per hen/day was determined.

This means that ideally the diet (11.82 MJ/kg) should provide 420 mg/d of Met and 777 mg/d of TSAA. By my estimation, most of our diets only provide 370 mg/d of Met and 620 mg/day of TSAA.

I am not sure that I fully understand the logic used here. In essence, by linking the amino acid requirement to the energy level of the diet, the recommendations are reduced at lower energy levels. Our understanding of amino acid nutrition is that the same amount of amino acid is required per gram of egg output or per kilogram of body weight, regardless of intake. To be fair though, I am not sure that reducing the energy level of the diet was ever intended when calculating the daily amino acid allocations in this manner.

The paper goes on to examine the ideal amino acid profiles that should be used when formulating diets for laying hens. In the table that follows I have included some of these values, along with the values that SPESFEED use (based on the work of Morris and Gous).

Table 1: Ideal amino acid profiles proposed by different authors

Source	SPES FEED	Coon & Zang	Leeson& Summers *	Bregen-dahl	Lemme
Lys	100	100	100	100	100
Met	47	49	51	47	50
TSAA	83	81	88	94	91
Thr	64	73	80	77	70
Trp	21	20	21	22	21
Arg	103	130	103	-	104
Ile	75	86	79	79	80
Val	100	102	89	93	88

*Calculated values using total amino acids, the other figures are for digestible amino acids

The work of Bregendahl is included in the table above. Although he acknowledged that the ideal profile would differ depending on the relative size, growth and relative egg output (as was done by Morris and Gous), he combined the amino acid requirements into a single profile. One cannot help wondering if this is the correct thing to do.

Lemme went on to evaluate the findings above from an economic perspective, stating correctly that maximum performance does not necessarily mean maximum profitability. Using typical European feed costs of Euro 180/ton of feed (about R 2000/ton) and Euro 15 per kg egg mass (about R 140/doz, which I am hoping is a typo), he determined that the optimal Lys intake should be 810 mg/day, Met 405 mg/day, TSAA 737 mg/day and Thr 567 mg/day.

Bregendahl determined the Lys requirement using a broken stick model (which he acknowledges is perhaps not the correct model for determining a most cost effective level) for maximum egg mass and feed utilisation to be 538 and 693 mg/day respectively, which he concluded corresponded well with those values reported in the literature.

What then does all this mean to those of us feeding laying hens in South Africa?

- Many of us use target Lys intakes of between 680 and 710 mg of Lys in our layer diets, very much in line with Bregendahl's finding.
- Our current diets enable us to get world-class performances with some farms averaging 85%

hen housed production on a year on year basis.

- When increasing the levels in typical South African diets in line with this recommendation of Lemme, the feed cost increases by R 125.00/ton, or about 6%. This is hard to justify when examining current performance levels.
- We need to bear in mind that average egg size on South Africa farms is smaller than those achieved in other parts of the world. This is a market requirement, and it is for this reason that we use the reverse cross (silver birds) in this country. I would suspect that this would mean egg outputs are lower and so too the amino acid requirements.

What is seldom considered is that individual laying birds are capable of adjusting their feed intake to meet their nutrient requirements. Intake within the individual birds in a flock can range from 85 g/birds to twice this amount. The fact that Lemme found a poor fit between Met level and the diet and egg output does not come as a surprise to me. Years ago I carried out a number of experiments with individual laying hens and I was not able to show a fit between amino acid level of the diet and egg output at all (r^2=<.1). Put another way, the Lys level of the diet had no impact on egg output. However, there was a relationship between Lys intake and egg output, demonstrating that hens that had a higher egg output potential, simply ensured that they consumed adequate levels of amino acid.

I would remind you all that the total protein levels used in the diet are immaterial. In work published in 2009, Burley *et al.,* fed diets to commercial flocks that were isocaloric and contained the same amino acid (balanced) levels, but with 0.75 and 1.5% less crude protein respectively. They were not able to show any significant differences in any egg production characteristics. The weekly margin over feed cost was 0.72 US cents per bird less in the case of the lowest protein diet, leading them to conclude that this was a commercially viable option.

Rick Kleyn

Feeding Growing Pigs

Our goal in finisher pigs is to maximize the return per unit of grower space per year. Largely, this is determined by the stocking densities used on any particular farm and by the diet that the animals receive. The data available for stocking density is mostly not applicable to our circumstances. However, we now have data that shows that feeding low protein diets is probably not financially viable. In addition, adding value to the feed by pelleting grower diets may be an attractive option.

We have come across two articles, the first presented at the Kansas Swine Day (2008) and the second at the same event in 2009. We have tried to use this data to demonstrate which strategy pig farmers should be using.

In the first article, Shelton and his co-workers looked into the requirement of growing pigs for Standardized Illeal Digestibility (SID) Lysine. The research set out to determine the levels that would result in the most cost effective diets, using different ratios of SID Lysine to Metabolisable energy. PIC pigs were used in the experiment. The diets used in the experiment are shown in table 1.

Table 1: The diets containing different SID Lysine levels used in the experiment.

SID Content (g/kg)	7	8	9	10	11	12
Yellow Maize	79.41	75.43	71.46	67.48	63.51	59.53
Soya O/C	15.49	19.47	23.44	27.42	31.39	35.37
Limestone	0.90	0.90	0.90	0.90	0.90	0.90
MCP	0.50	0.50	0.50	0.50	0.50	0.50
Salt	0.35	0.35	0.35	0.35	0.35	0.35
Tallow	3.00	3.00	3.00	3.00	3.00	3.00
Lysine HCL	0.15	0.15	0.15	0.15	0.15	0.15
Premix	0.20	0.20	0.20	0.20	0.20	0.20
Phytase	0.01	0.01	0.01	0.01	0.01	0.01
TOTAL	100.01	100.01	100.01	100.01	100.01	100.01

The theoretical analysis of these diets is shown in Table 2. By building the formulations used into the SPESFEED matrix we have been able to fill in some of the gaps in the data given in the paper (highlighted in grey). As can be seen the ME values used by the researchers and the DE values used in the SPESFEED matrix are very similar. SPESFEED made a decision some time ago to make use of the INRA Net Energy system, precisely to deal with situations such as this. As can be seen the Net Energy of the lower protein diet (SID 7g/kg) is nearly 7% higher than the high protein diet (SID 12g/kg).

The other point of interest is the TSAA level of the diets used in this experiment. As can be seen the TSAA: Lysine ratio changes from 0.62 to 0.51. PIC recommendation in this regard is 0.55, which means that the amino acid under test (lysine) may not have been the first limiting amino acid in some of the treatments in this experiment and that the results may well have been distorted. Had the diets been formulated making use of NE rather than ME as a measure of energy and had the amino acid profile been maintained by making use of the correct amino acid profile, it is likely that the animals on the higher protein diets would have performed better than reported here.

Table 2: Calculated nutrient analysis of the diets. The values calculated by SPESFEED (grey).

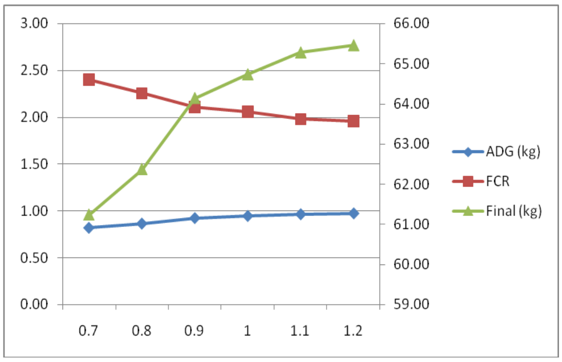
SID Content (g/kg)		7	8	9	10	11	12
Crude Protein	g/kg	141.00	156.00	171.00	186.00	201.00	217.00
ME Swine	MJ/kg	14.86	14.85	14.84	14.84	14.83	14.82
DE Swine	MJ/kg	14.90	14.91	14.92	14.93	14.94	14.95
NE Swine)	MJ/kg	10.92	10.78	10.65	10.51	10.38	10.24
Crude Protein	g/kg	139.22	154.35	169.43	184.56	199.64	214.77
SID Lysine	g/kg	7.00	8.00	9.00	10.00	11.00	12.00
Avl Lysine)	g/kg	6.45	7.37	8.29	9.21	10.13	11.05
Avl TSAA	g/kg	4.00	4.32	4.65	4.98	5.31	5.64
Avl Phosphorus	g/kg	2.40	2.40	2.50	2.50	2.60	2.60
Calcium	g/kg	5.10	5.20	5.40	5.50	5.60	5.70
Sodium	g/kg	1.54	1.54	1.54	1.55	1.55	1.56
Fat	g/kg	64.26	63.47	62.67	61.88	61.08	60.29
NDF	g/kg	107.41	107.49	107.58	107.67	107.75	107.84
SID:ME		0.47	0.54	0.61	0.67	0.74	0.81
Avl Lys:NE		0.59	0.68	0.78	0.88	0.98	1.08
Avl TSAA:Avl Lysine		0.62	0.59	0.56	0.54	0.52	0.51

Despite our concerns about the diets used in these experiments, some interesting results were obtained (Table 3 and Figure 1). We have taken the liberty of translating the data into metric units and then applying some typical South African costs to the results (Table 4).

Table 3: Technical performance achieved on diets containing different SID Lysine levels.

SID Content (g/kg)	7	8	9	10	11	12
Start Weight (kg)	38.19	38.10	38.19	38.24	38.28	38.19
Daily Gain (kg)	0.82	0.87	0.93	0.95	0.97	0.98
Feed Intake (kg)	1.97	1.95	1.95	1.95	1.91	1.91
FCR	2.40	2.25	2.10	2.05	1.98	1.95
End Weight (kg)	61.24	62.37	64.14	64.73	65.27	65.45

Figure 1: Technical performance achieved on diets containing different SID Lysine levels.



Whilst it is difficult to read too much into an experiment that we suspect was ill conceived, the answers are still useful. Clearly, it does not pay to use SID Lysine level for growing pigs that are too low, and in SPESFEED's terms, diets for PIC pigs in the range of about 38 to 65kg should be fed at least 10 g/kg of Available Lysine. Had the Net Energy and Met levels been adjusted, we believe that the diets containing higher SID Lysine levels would have performed better than reported here.

As the pork price decreases, it may be an option for producers to feed slightly lower spec diets (as highlighted in table 4) but in our opinion this needs to be done with caution as it is easy to slip down too low and end up costing yourself money.

Table 4: Feeds costs and Margin Over Feed (MOF) at different pork prices

SID Content (g/kg)	7	8	9	10	11	12
Feed Cost (R/ton)	2350.00	2450.00	2550.00	2653.00	2754.00	2855.00
Income (R/pig)	345.64	364.01	389.19	397.35	404.84	408.92
Feed Cost (R/pig)	129.84	133.85	139.13	144.26	146.91	152.04
MOF @ R 18/kg	284.93	302.96	327.89	332.57	338.89	338.66
MOF @ R 15/kg	215.80	230.16	250.05	253.10	257.92	256.88
MOF @ R 12/kg	146.67	157.36	172.21	173.63	176.96	175.09
MOF @ R 9/kg	77.54	84.55	94.38	94.16	95.99	93.31

In the second paper, Potter and his co-workers reported on two experiments where the performance of growing pigs fed pelleted diets as opposed to meal was measured. Table 5 contains a summary of the results of the first trial in which typical corn soy diets were used. Again we have taken the liberty of translating the results into metric figures and applying some typical South African costs to the data. As can be seen, the animals eating the pelleted feed grew faster and had an FCR that was 15 points lower than the pigs fed the meal diet. Even when we added a pelleting cost of R 100.00/ton, the pellet fed animals realised a R 57.75 increase in return (51 cents/day)

Table 5: Performance, costs and Margin Over Feed (MOF) feeding typical corn soy diets in either pelleted or meal form.

	Meal	Pellets
Initial Weight (kg)	26.98	26.98
ADG (g)	853.33	906.67
ADFI (kg)	2.42	2.43
FCR	2.83	2.68
Final Weight(112 days)	119.56	125.60
Feed Cost (R/ton)	2800.00	2800.00
Pelleting Cost		100.00
Income Pig (R 15/kg)	1793.33	1884.00
Feed Cost Pig	733.59	766.49
MOF (Rand/pig)	1059.75	1117.51

In the second experiment, a cheaper set of diets, based on fortified hominy feed (this is the only information given). The results are presented in Table 6. Although the improvement in performance we poorer, the authors suspect that poorer pellet quality may be the reason for this, the animals fed on pellets were R 14.21 more profitable.

Table 6: Performance, costs and Margin Over Feed feeding alternate in either pelleted or meal form.

	Meal	Pellets
Initial Weight (kg)	25.87	25.91
ADG (g)	866.67	911.11
ADFI (kg)	1.84	1.89
FCR	2.12	2.07
Final Weight(112 days)	62.40	64.22
Feed Cost (R/ton)	2800.00	2800.00
Pelleting Cost		100.00
Income Pig (R 15/kg)	936.00	963.33
Feed Cost Pig	216.86	229.98
MOF (Rand/pig)	719.14	733.35

Walter Scharlach & Rick Kleyn

SPESFEED (Pty) Ltd
PO Box 48
Rivonia 2128
South Africa
Tel + 27 11 803 2050
Fax + 27 11 803 8201
www.spesfeed.co.za