Four Seasons and China agriculture.



New productive possibilities.



Four Seasons have been manufacturing nutrient supplement technology allowing farm animals to easily digest such rice straw roughage. Because of Australia's dry climate and dry feed, we have leaned to supplement dry feed , allowing improved digestion of otherwise poor dry feed. Supplementation allows improved red meat production, more wool, and milk output. Rice straw is a valuable resource that doesn't need to be burned, rather converted into beef and sheep animal feed, when supplemented with nutrient supplements manufactured by Four Seasons Pty Ltd.































By utilising rice stubble as a new and potential feed source, when supplemented with imported Four Seasons products, the following goals are achievable:

a. Large reductions in Chinese air pollution from reduced burning of rice stubble

b. Rice stubble becomes a cheap and excellent dry feed source that historically was considered useless and only worth burning.

c. Ruminants (Cattle, sheep, goats) can easily digest dry rice stubble when supplemented properly, increasing productive output of more beef and sheep progeny, higher fertility and quicker growth rates.

d. China is able to increase its domestic production of red meat resources using local feeds that have been considered previously useless















China has great potential to improve the diets of its people via increased red meat consumption, whilst reducing serious air pollution problems associated with yearly mass burning of rice stubble.





Improving Productivity. Improving Environment.

China is rapidly developing a demand for high quality beef and sheep meats, red meat proteins that benefit healthy human existence. Imports of beef and sheep products to China are growing rapidly, as the quality of Australian grown produce is appreciated.

Australian farmers have been developing genetic advancements and associated productive feeding practices for over 100 years, now providing world class quality red meat proteins to many overseas markets.

Four Season's recent travels to China, looking for partners in agriculture, has identified practical opportunities to offer advice and Australian manufactured products designed increase on farm productivity within the Chinese domestic sheep and cattle markets, as well as help benefit the environment with improved farming practice.



China announces \$1.6 billion air pollution fund

In Feb 2014, the Chinese Government announced a \$1.6 billion air pollution fund, now available to Provinces. China is the largest producer of rice in the world. The problem of rice stubble reduction and burning is a major concern for Chinese authorities:

Burn to air or burial in soil: The fate of China's straw residues Burn to air or burial in soil: World news 13/2/2014

One of the most important, but under utilized biomass resources in the world today is the large amount of straw that is generated from the production of crop plants such as wheat, rape seed, and cotton. Currently, most of this biomass is burned resulting in air pollution and loss of a potential carbon feedstock for improving soil fertility. This problem is especially evident during the months from May to June, when winter wheat and rape seed crops under double cropping with summer rice are harvested in southern China. Burning straw residues in the field generates black carbon particulates, giving rise to deteriorated air quality in adjacent cities. In 2011, the air pollution caused by this practice was especially serious due to the severe "100-year" drought in southern China. Following severe levels of air pollution in May in Chengdu City, the capital of Sichuan, the largest agricultural province of Southwest China1, the cities in metropolitan urban area of Yangtze Valley Delta region all suffered extreme air pollution to the extent that it was reported in the local media on the of many airplane flights and caused breathing problems..

Four Seasons is an Australian manufacturing company located in Brisbane, currently supplying major rural retail outlets such as Landmark, Elders and CRT with high quality nutrient products. (See adverts attached and webpage). We believe that China holds enormous potential as an export market for our products. We look forward to providing a mutual advantage for Australian and Chinese agriculture.

www.fourseasonco.com.au









Dry Spell

A Molasses Block Supplement Containing 10% Urea

Dry Spell is a molasses based block containing 10% Urea & 8% Bypass Protein Meal. It is suitable for all sheep & cattle grazing on dry pastures or stubbles. Dry Spell allows sheep & cattle to successfully convert more pasture feed into body protein, especially in dry or wintery conditions enabling your stock to maintain a better condition. As with all blocks the placement and availability to animals is important so please follow the feeding instructions.

Typical Analysis		
Urea	100 g/kg	10%
Bypass Protein Meal	80 g/kg	8%
Total Minimum Crude Prote	in	32%
Molasses	500 g/kg	50%
Salt (NaCl) Max.	52 g/kg	5.2%
Calcium (Ca)	30 g/kg	3%
Magnesium (Mg)	29 g/kg	2.9%
Phosphorus (P)	15 g/kg	1.5%

Note: The above analysis represents the condituent ingredients and relative proportions of the typical product only. Actual constituent ingredients and relative proportions may vary from that outlined above. Pack Sizes 20kg, 40kg & 100kg Blocks

AVERAGE CONSUMPTION

Based on 20kg block

Cattle: 1 block per 15 head

Sheep: 3 blocks per 100 head

Replace immediately when consumed.

Note: Average block consumption will increase in highly phosphate deficient areas and with poor quality feed.

Warning: This product contains Urea that may be harmful to animals if not properly administered. Do not feed to starving animals or animals in poor condition. Make sure that a bulk of roughage is always available when feeding this product. Rain may cause this product to deteriorate. Do not place this product near dams or creeks as cattle may roll block into water. Do not feed out other Urea products while feeding this product.





Cow & Calf

(Molasses Based Formula)

A high intake molasses phosphorus block for beef cattle

Calving is a critical time for breeding stock. Good mothers need excellent nutrition before and after calving to ensure the health of their calves and themselves.

COW & CALF is a balanced mineral block with bypass protein meal, magnesium, selenium and other essential macro and micro minerals.

Pastures constantly change in nutritional quality. COW & CALF has been designed to complement nutrition in cattle's diets throughout the calving period.

Pack Sizes

20kg, 40kg & 100kg Blocks

AVERAGE CONSUMPTION

100kg: 1 block per 50 head 40kg: 1 block per 30 head 20kg: 1 block per 15 head

Replace as needed.

(Average consumption: 200 g per head per day)

Note: Average block consumption will increase in highly phosphate deficient areas and with poor quality feed.

Warning: This product contains Urea that may be harmful to animals if not properly administered. Do not feed to starving animals or animals in poor condition. Make sure that a bulk of roughage is always available when feeding this product. Rain may cause this product to deteriorate. Do not place this product near dams or creeks as cattle may roll block into water. Do not feed out other Urea products while feeding this product.

Typical An	alysis	
Key Macro Ingredients		
Phosphorus (P)		5%
Calcium (Ca)		7%
Magnesium (Mg)		3.2%
Key Micro Ingredients		
Selenium (Se)	22 mg/kg	
lodine (I)	68 mg/kg	
Organic Minerals		
Zinc (Zn)	330 mg/kg	
Manganese (Mn)	240 mg/kg	
Copper (Cu)	95 mg/kg	
Molasses	380 g/kg	38%
Urea	100 g/kg	10%
Bypass Protein Meal		2%
Total Minimum Crude Protein		29%
Salt (NaCl) Min.		3%
Salt (NaCl) Max.		5%

Note: The above analysis represents the constituent ingredients and relative proportions of the typical product only. Actual constituent ingredients and relative proportions may vary from that outlined above.





Greenspell

A Mineral/Trace Element Molasses Block

Highly productive grazing animals need a balanced supplement when grazing to ensure that production on grass is maximised. When pastures are green, minerals are usually needed to ensure that proteins in grass / pasture is fully utilised in the rumen.

Greenspell is a molasses high quality based product designed to be attractive to all livestock, safe to use under all conditions, even allowing horses and goats to graze on it alongside sheep and cattle.

Containing essential nutrients to help with soil deficiencies, Greenspell allows animals to take what they need when they need it, also manufactured to be weatherproof. Take out the guess work when feeding your stock with Greenspell, and allow your stock to chose what they need.

Pack Sizes

20kg & 100kg Blocks

AVERAGE CONSUMPTION

Cattle:

20kg blocks - 5 blocks per 100 head 100kg blocks - 3 blocks per 100 head

Replace immediately when consumed.

Note: Average block consumption will increase in highly phosphate deficient areas and with poor quality feed.

Typical Analysis

	6.50	
Molasses	520 g/kg	52.0%
Bypass Protein Meal	80 g/kg	8.0%
Salt	100 g/kg	10.0%
Total Min Protein		3.4%
Magnesium (Mg)	40 g/kg	4.0%
Calcium (Ca)	27 g/kg	2.7%
Phosphorus (P)	13 g/kg	1.3%
Zinc (Zn)	200 mg/kg	
Copper (Cu)	120 mg/kg	
Cobalt (Co)	20 mg/kg	
Selenium (Se)	22 mg/kg	
lodide (I)	17 mg/kg	

Note: The above analysis represents the constituent ingredients and relative proportions of the typical product only. Actual constituent ingredients and relative proportions may vary from that outlined above.





Pre-Lamb

A Protein / Nutrition Supplement for Ewes & Lambs

With the successful explosion of the Australian lamb market, producers now must ensure that their lambing percentages are maximised. It all comes down to the quality of nutrition for the lambing ewe. PRE-LAMB's new techology depends on feeding high quality bypass protein meal and macro minerals to ewes prior to lambing.

By feeding ewes 6–8 weeks prior to lambing, colostrum levels are improved in lambing ewes, which in turn leads to improved lambing weights and results in higher survival rates.

Healthy and heavier lambs means more money in the bank, and that is where PRE-LAMB becomes an important management tool for lamb producers. By supplementing pasture with high quality nutrients in PRE-LAMB, ewes have a convenient and quality nutrition source available 24 hours a day when they need it, which improves digestion of forage as well as helping to supply valuable minerals and protein. Considering that many ewes are able to produce twin lambs, extra supplementation using PRE-LAMB is a wise economic choice in ensuring that ewes can express their full genetic potential in successfully mothering twins to weaning.

Pack Size 20kg Blocks

AVERAGE CONSUMPTION

4 blocks per 100 head per 20 days

Replace as needed.

Note: Average block consumption will increase in highly phosphate deficient areas and with poor quality feed.

Typical Analysis

Bypass Protein Meal	400 g/kg	40%
Molasses	80 g/kg	8%
Min Crude Protein from natural source	s 148 g/kg	14.8%
Minimum Total Protein	148 g/kg	14.8%
Mineral Analysis		
Salt (NaCl) Max.	300 g/kg	30%
Sulphur (S)	25 g/kg	2.5%
Calcium (Ca)	50 g/kg	5%
Zinc (Zn) 1	000 mg/kg	
Iodine (I) 1	500 mg/kg	
Selenium (Se)	56 mg/kg	
Copper (Cu)	500 mg/kg	
Cobalt (Co)	200 mg/kg	
Magnesium (Mg) 1	.000 mg/kg	

Note: The above analysis represents the constituent ingredients and relative proportions of the typical product only. Actual constituent ingredients and relative proportions may vary from that outlined above.

















Elders Rural Services Australia Limited 27 Currie Street

Adelaide, SA, Australia 5000 GPO Box 551, Adelaide SA 5001 p | 08 8425 5347 f | 08 8425 4627 greg.densley@elders.com.au

TO: Whom it may concern Re: Four Seasons Company Pty Ltd

26 March 2014

Elders Rural Services Australia Pty Ltd Is a rural services and farm supplies business celebrating our 175th anniversary in 2014. Our business has an annual turnover of around \$5 billion Au dollars.

We offer the farming industry in Australia a wide range of products and services, including but not limited to:

Livestock Trading Wool Trading Real Estate Financial services (banking, insurance and financial planning) Farm Supplies: Livestock production inputs Crop chemicals Fertilizer General farm inputs such as fencing and water storage products

Elders has had a long standing relationship with the Four Seasons Company Pty Ltd, they have been supplying quality livestock nutritional products to Elders which has added to the well being and improved productivity of our client's live stock.

Four Seasons Company has proved to be a valuable business partner, reliable and efficient as well as a pleasure to do business with.

Regards

Greg Densley

National Supplier Relationship Manager Animal Health and General Merchandise



Landmark Operations Limited ABN 73 008 743 217 380 La Trobe Street, Melbourne, Victoria 3000, Australia GPO Box 4562, Melbourne, Victoria 3000, Australia T: 03 9209 2000 F: 03 9670 2782 www.landmark.com.au

Agrium Snapshot

Employees: Approximately 15,800 & a market cap of \$17 billion U.S. (Jan. 31, 2013) Unique Feature is Agrium is the only publicly traded company that crosses the entire agricultural value-chain.

Agrium is a major retail supplier of agricultural products and services in North and South America and Australia and a leading global producer and marketer of agricultural nutrients and industrial products. A key differentiator of Agrium is that we are the only publicly traded company that crosses the entire agricultural value-chain. Our strategy is to grow through incremental expansion of our existing operations and acquisitions as well as the development, commercialization and marketing of new products and international opportunities. The Australian business branded and operating as Landmark (comprised Landmark Operations Limited and Landmark Limited) provides merchandise& fertiliser & provides finance, insurance, real estate, commodities trading, farming equipment sales, etc. to Australian farmers across approximately 320 Landmark and affiliated locations (including other agricultural sectors such as wool and livestock).

Four Seasons has been a strong preferred supplier of the Landmark business for a significant period of time now and provides excellent products and services to the Landmark business.

Scott MacGregor National Procurement Manager – Animal Health and Wholesale Landmark Operations

MANAGEMENT SYSTEM CERTIFICATE

Certificate No: 210850-2016-AQ-AUS-JAS-ANZ Initial certification date: 20, December, 2010 Valid: 20, December, 2016 - 15, September, 2018

DNV.GL

This is to certify that the management system of

4 Season Company Pty Ltd

9-11 Platinum Street, Crestmead QLD 4132 Australia

has been found to conform to the Quality Management System standard:

AS/NZS ISO 9001:2008

This certificate is valid for the following scope:

Development and Manufacturing of Animal Nutrition for Cattle, Sheep, Horses, Goats and Fishing Products. Excluding Design and Development.

Place and date: Sydney, 14, November, 2016



For the issuing office:

Yngve Amundsen Management Representative

Accreditation by the joint accreditation system of Australia and New Zealand, Acc S 1311292 AS Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid. Refer to appendix for current certificate site address. <u>URL:www.jas-anz.org/register</u> ACCREDITED UNIT: DNV GL Business Assurance Australia Pty Limited, Level 4, 181 Miller Street, North Sydney NSW 2060, Australia. TEL:+61 299 00 9500. www.dnvba.com.au



ustralian Government

Australian Pesticides and Veterinary Medicines Authority

LICENCE TO MANUFACTURE VETERINARY CHEMICAL PRODUCTS

Licence Holder:

er: 4 Season Company Pty Ltd

Licence No: 4099

ACN 075 508 664

The APVMA hereby issues a licence under section 123 of the Agricultural and Veterinary Chemicals Code (Agvet Code) to the above named person (the Licence Holder) to carry out the following step(s) of manufacture:

Quality assurance (QA) of raw materials, formulation including blending, filling, packaging, labelling, analysis and testing (physical), storage and release for supply.

This licence authorises the manufacture of the following type(s) of veterinary chemical products only:

Category 4 (Premixes/Supplements) - Medicated blocks

-at the following premises:

9-11 Platinum Street CRESTMEAD QLD 4132

This licence is subject to the conditions set out in subsection 126(4) of the Agvet Code, regulations 60, 61 and 62 of the *Agricultural and Veterinary Chemicals Code Regulations* 1995 (Agvet Code Regulations) and the **additional conditions in the attached Schedule.**

This licence comes into force on the date of issue and replaces the previous licence issued on 25 August 2016. This licence remains in force unless otherwise suspended or cancelled by the APVMA.

Dated this 12th day of January 2018

FM_MQL17

Hasina Pervin Acting Assistant Director, Manufacturing Quality and Licensing

> Delegate of the Australian Pesticides and Veterinary Medicines Authority

This licence remains the property of the APVMA and must be returned on request

Improving the intake and utilization of by-product-based diets M. A. El-Naga

Faculty of Agriculture, University of Alexandria Alexandria, Egypt

Abstract Introduction Materials and methods Results Discussion

Abstract

The voluntary feed intake or chopped corn stalks was improved (23%) by just increasing moisture content from 30 to 60%. Due to such treatment, sheep performance turned from losing 54 g/head/day to gaining 21.3 g/head/day. Addition of 5% linseed meal doubled the consumption of corn stalks and resulted in a daily gain of 53 g/head/day. Such percentage of linseed meal was comparable to 20% concentrate mixture supplement.

Supplementation of the urea treated corn stalks with 1.5% urea and 3% molasses improved the intake by 63%. Supplements varied in their effect on consumption, however, it did not affect the (TDN) content of the supplemented diet.

Recognising the deficient minerals in a by-product based diet (by mineral balance trials) and supplementing the diet with the recognized deficient amounts of minerals, resulted in improving the (TDN) content, the rate of body weight gain and the kg feed/gain ratio.

Introduction

Feed intake of agricultural by-products is mostly below the required level to maintain the animal's body weight. Its tough texture, poor digestibility and nutrient deficiencies all contribute to its low level of consumption.

This present paper describes some approaches to improve both the voluntary feed intake of by-products based diets and the efficiency the animal utilizes such diets. Moistening, supplementing and compensating for deficient minerals were tried as feasible methods of improvement.

Materials and methods

Experiment 1. Effect of moistening the by-product-based diet on its voluntary feed intake by sheep

A group (10 animals) of Barki male sheep of an average body weight of 30 kg was fed a diet of chopped (3-5 cm) corn stalks to which molasses, urea, vitamin A and minerals were added (Table 1). Moisture content of this diet was 30%. It was increased by water addition in two steps, e.g., 47 and 60% voluntary feed intake was measured at the three moisture levels. Measurement of intake was made in the third week of each treatment.

Table 1. Composition of the corn stalks diet.

Ingredients	Per cent
Chopped corn stalks	86
Molasses	10
Urea	1.5
Vitamin A	0.1
Mineral mixture *	2.4
Crude protein	7.9
(TDN)	52

* Composition of the mineral mixture was (%): 36 magnesium sulphate, 0.8 zinc oxide, 1.2 manganese oxide, 14 ferrous chloride and 48 bone meal.

Experiment 2. Effect of some supplements on the voluntary feed intake

Chopped corn stalks were fed to a group (10 animals) of 32 kg Barki male sheep for two weeks. Voluntary feed intake was measured during the last 5 days of the two weeks experimental period. Supplements which are shown in Table 2 were tested in sequence. The TDN content of the diet with each supplement was conventionally estimated using two male sheep.

Table 2. The tested supplements to the corn stalks-based diet.

1.	Corn stalks (CS)
2.	1% urea + 0.1 % vitamin A
3.	30% concentrate mixture *
4.	Treatment with 5% urea solution
5.	1.5% urea + 3% molasses
6.	0.3 phosphoric acid + 0.1% minerals *
7.	20% concentrate mixture + 1% Ca
	carbonate + 0.1% minerals
8.	5% linseed meal

* Contains (%): 2 g cottonseed meal, 30 yellow corn, 30 wheat bran, 5 rice bran, 3 molasses, 1 salt and 2 Ca carbonate.
** Contains (%): 36 magnesium sulphate, 0.8 zinc oxide, 1.2 manganese oxide, 14 ferrous chloride and 48 bone meal.

Experiment 3. Effect of compensating for recognised deficient minerals on the TON content and on the performance of buffalo calves fed the same diets after mineral supplementation.

Three diets containing rice straw at a rate of 40 to 55% (Table 3) were fed to three groups (10 heads per each diet) of buffalo calves. Growth rate and the kg feed/gain ratio were measured. The initial body weight of the animals was about 200 kg. Digestibility and mineral balance trials were conducted conventionally on two male animals. The recognised deficient mineral amounts were added to each diet and all parameters were measured again.

Ingradianta	Per cent			
Ingredients	1	2	3	
Rice straw	40	55	43	
Berseem has	10	25	-	
Concentrate	40	7.5	14	
mixture				
Molasses	6	8	8	
Urea	1.5	1.5	2	
Minerals and	2.5	3	3	
vitamin A				
Horsebean straw	-	-	30	

* Composition of concentrate mixture (%): 29 cottonseed meal, 30 yellow corn, 30 wheat bran, 5 rice bran, 3 molasses, 1 salt and 2 Ca carbonate.

Results

Experiment 1. Effect of moistening a corn stalks-based diet on its consumption by sheep

About 23% improvement in sheep intake was induced by just adding water to the by-products diet (Table 4). The body weight change was negative before moistening and it turned to positive at 15 g/head/day (Table 4). Improvement due to raising moisture from 30% to 47% was less than that due to increasing it to 60%.

Table 4. The voluntary feed intake (on DM basis) and body weight changes of sheep fed chopped corn stalks of different moisture contents.

Moisture	Voluntary body weight		
content %	Feed intake	Change (g/head/day)	kg feed/gain ratio
30	258	-54	-
47	280	0.0	-
60	319	15	21.3

Experiment 2. Effect of some supplements on the voluntary feed intake and TDN content of the corn stalks-based diet

Table 5 shows the response of voluntary feed intake of sheep and TDN content of the corn stalks-based diet to different supplements. Urea supplementation at the rate of 1% improved the feed intake by about 25%. Combining urea treatment with urea addition resulted in 63% improvement in intake. Supplementation with concentrate mixture (30%) resulted in 47% increase in the intake. Combining concentrates with minerals raised the rate of improvement to 78%. Linseed meal at a rate of 5% was as effective in improving intake almost as 20% concentrate mixture plus minerals.

Table 5. Effect of different supplements on the voluntary feed intake and TON content of corn stalks-based diet.

Voluntary feed	TDN %	
Added supplement	intake (g/head/day)	on DM basis
- No supplement	563	54
- 1% urea and 0.1% vit. A	706	55
- 30% concentrate mixture	832	56
- Treatment with 5% urea	814	54
- Treatment with 5% urea		
+ 1.5% urea + 3% molasses	920	56
- Treatment with 5% urea + 0.3%		
phosphoric acid + 0.1% minerals *	774	54
- 20% concentrates mixture ** +		
1% Ca carbonate + 0.1% minerals	1003	56
- 5% linseed meal	968	55

* Its content is (%): 36 magnesium sulphate, 0.8 zinc oxide, 1.2 manganese oxide, 14 ferrous chloride and 48 bone meal.

** Its content is (%): 25 cottonseed meal, 30 corn, 30 wheat bran, 5 rice bran, 3 molasses, 1 salt and 2 Ca carbonate.

Experiment 3. Effect of adjusting the mineral pattern of the diet according to the results of balance experiments, on the diet's nutritive value and efficiency

The results of some mineral balance experiments are shown in Table 6. The negative balances of some minerals were corrected by adding the corresponding deficient amount of salt to the diet.

Mineral	Diet number		
(g/head/day)	1	2	3
Са	-10	-14	-13
Ρ	14	7	4
Na	2	13	5
K	12	16	-13
Fe	-2	-1	-1
Cu	0	0.2	-1
Zn	0	0	0
Mg	1	2	2
Mn	-0.1	0	0.4

 Table 6. Balance of some minerals measured on buffalo calves fed the three experimental diets.

The TDN contents, body weight gain and the kg feed/gain ration, measured before and after this adjustment are presented in Table 7. Diet 3 showed more mineral deficiencies than the other two diets. Accordingly, it benefited more from compensating for the recognised deficient minerals. This could be judged from the improvement of daily body weight gain and kg feed/gain ratio (Table 7).

Discussion

Increasing the moisture content of corn stalks improved its intake, and resulted in better utilization of the consumed amount. It is just some calculated amount of water, added to the diet of sheep losing weight that turned the situation to gaining weight. The details of such a phenomenon is not understood yet. This is a point that needs to be investigated further to make better use of it with tough by-products feed. The present results in this connection draw the attention to try levels of moisture higher than that presently tested (60%). It is thought that this is the simplest and cheapest method of treating poor quality byproducts.

Table 7. The TDN body weight gain and kg feed/gain ratio measured on buffalo calves fed the three experimental diets, before and after adjusting the mineral pattern of the diets.

Diet number				
1	2	3		
51	51	58		
59	61	64		
0.65	0.68	0.25		
0.87	0.79	1.10		
Kg feed/gain ratio:				
8.4	13.9	24.2		
6.4	10.0	7.1		
	51 59 0.65 0.87 8.4	12515159610.650.680.870.798.413.9		

Ammonia treatment showed to be very effective in improving the level of voluntary feed intake of chopped corn stalks. Supplementing the ammonia-treated material with urea (1.5%) again improved the level of voluntary feed intake. The alkaline treatment helped through the process of delignification or dislocation, while urea addition enriched the protein level in the diet. However, linseed meal at a level of 5% was equivalent or even better than the combined alkaline treatment and urea addition. The cheaper of these two treatments would be the clue to improving the intake and perhaps the better utilization of such by-products. It was very interesting to observe that TON content of any of the supplemented (Table 5) diets was almost constant. Since the rate of defecation is a reflection of the rate of ruminal outflow, it could be concluded that the tested supplements (Table 5) exerted its improving the extent of digestion.

The approach of investigating the mineral balance on a diet and supplementing the diet with the deficient amounts of minerals showed to be very effective in improving the feeding value of the by-products based diets (Table 7). The accumulated experience in this connection showed the significance of adjusting the Ca/P and the adequacy of K and Na. This approach showed frequently that minerals which may be estimated in a diet would not necessarily be of value for the animal because they may be unavailable to a certain degree or even completely. This means that some diets would contain high levels of some minerals even though there may be a need to supplement with such minerals. Availability of minerals is suggested to be estimated besides the estimation of the minerals themselves. This will be an important clue to the improvement of the by-products₂₅ consumption and utilization.



Proud Suppliers of Quality Animal Nutrition

SUPPLEMENT BLOCKS

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