Waste not, want not ...

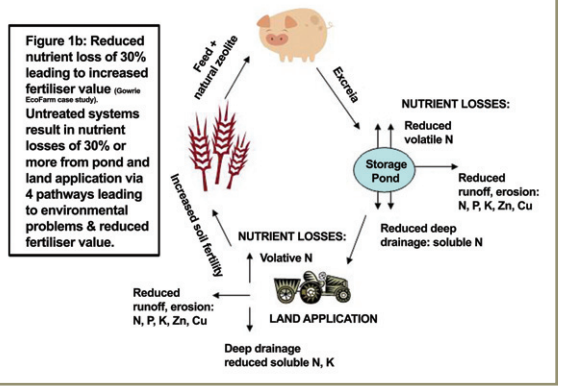
with Natural Dietary Zeolite

By JAIME NEWBORN

THE TWO QUESTIONS *How to increase animal weight gain and productivity?* and *What to do with effluent?* may seem to have little in common, but work done by Ken Crawford (researcher, consultant and farmer at Boggabri, NSW) is providing answers to both.

Ken has investigated the effect of using a natural addition – namely, clinoptilolite (a natural dietary zeolite) – in animal feed and effluent on his piggery Gowrie EcoFarm for the past 10 years, gaining a Master of Sustainable Agriculture degree from the University of Sydney in the process. His findings are encouraging for farmers looking into sustainable closed-loop or integrated systems and could alter the approach taken on traditional intensive farms in the pork, dairy and chicken meat industries.

Nutrient-saving flow chart



"We found by adding zeolite into the pigs' diets we could look after both the environment – by reducing the level of nutrients excreted by animals – and the farmer by increasing the daily weight gain of pigs through more efficient feeding," says Ken.

By adding just 5% dietary zeolite into pig rations, Ken recorded a 16% improvement in daily gain for weaner pigs, a reduction in mortality rates and scours (diarrhoea) and an improved lean-to-fat-cuts ratio. "This suggests better digestion of protein in the diet and less N (nitrogen) excreted where dietary zeolite is used," says Ken.

Additionally, by also adding zeolite as a treatment to pig effluent in slurry ponds, he has created a means of turning potentially hazardous manure into "a valuable fertiliser and a renewable resource, capable of saving big dollars".

What's more, he's now obtaining record crop yields.

"Our target yields are now 7.5 tonnes per hectare for wheat and 3t/ha for soybean crops. Our best crop was more than 8.5t/ha of wheat in an experimental block using only treated liquid pig manure as fertiliser, for which we received a premium price," says Ken.

The application used was Red Rock Booster: a zeolite powder created by Ken using zeolite sourced by Castle Mountain Zeolites (which has since purchased the product trademark), mined in Quirindi, northern NSW.

"The powder is particularly effective as an animal feed additive because of its particle size and it has been researched and trialled," says Ken.

With high levels of untreated excretion currently a major concern for the pork industry internationally – untreated excretion can have serious environmental impacts due to the leaching of concentrated minerals including nitrogen (N),

What are zeolites?

ZEOLITES are crystalline, aluminosilicate minerals found in some volcanic rock formations, useful in agriculture as absorbers and carriers of nutrients. More than 50 natural types of zeolite have been recognised, with more than 100 synthesised in the laboratory. The agricultural benefits of zeolite rely on the composition of each individual zeolite type.

What does zeolite do?

DIETARY Natural Zeolite's main agricultural purpose is to:
* reduce the amount of nutrients excreted;
* retain nutrients in the effluent stream; and
* release nutrients as plant fertiliser further to slurry spreading.

LEFT Ken Crawford with zeolite on Gowrie EcoFarm.

FAR LEFT Zeolite-treated manure spreader in action.

phosphorus (P) and potassium (K) – Ken says blocking nutrient loss pathways by treating effluent with zeolite is a breakthrough.

"Typically, in untreated effluent a major portion of N volatises to NH3 (ammonia gas) and is lost to the atmosphere. What is left in slurry ponds can turn into nitrate, which is soluble and causes all sorts of environmental havoc," says Ken.

He says the key to addressing nutrient loss is to take a 'whole-farm' operational approach.

"That begins with nutrition management. For example, a trial in Canada found using zeolite as a feed additive for pigs resulted in manure excretions with 15% less N and 22% less P.

"On top of that, treating slurry with zeolite safeguards against N loss until it is ready to be taken up by plants. In our trials, adding zeolite to feed significantly reduced nutrient loss and increased fertiliser value."

Ken says reducing NH3 also reduces odour – "something which makes the neighbours very happy and creates a better environment for pigs and people".

He says currently for every 100 sows the value of nutrients excreted annually (and potentially able to be saved) in an average piggery amounts to around $32,000, including $14,000 of N.

As a passionate landowner, he is also pleased to have avoided the potentially negative impact of artificial fertilisers on microbes in his soil.

"When applied through manure spread on the ground, zeolite can encourage microbial activity and add to soil fertility."

He says although the farm has not reached 'certified organic' status as yet, he believes a biological approach to soil management is the key to sustainable agriculture – "on Gowrie EcoFarm, natural zeolite is playing its part". He says organic matter and soil water-holding capacity has been greatly improved since using zeolite, with historically poorer-yielding fields experiencing a new lease on life.

How is pig effluent stored and applied?

At Gowrie EcoFarm, 60 sows produce about 1500 prime porkers per year for the Sydney market.

Effluent is captured in three sheds with partly slatted floors placed over V-drains. Three ponds store effluent in winter to spread in summer on the wheat fallow.

Treated manure is applied to crops used for pig-feed with a tractor-drawn 10,000-litre tanker, which turns around four loads per hour, spreading over 10 meters. Treated effluent is spread evenly (due in part to the anti-caking properties of zeolite used) to a depth of around two millimetres. The process is managed in part by an on-board computer linked to a ground-speed sensor.

"The principle is that a little bit in the right place is better than a lot in the wrong place," says Ken.

Following integrated farming principles, crops are then milled on-farm to provide nutritious cereal grains for the pigs' diet. "The grain is high in protein and energy, which goes straight back to the animals, completing the cycle," says Ken.

From his own experiences, Ken recommends a maximum inclusion (by weight) rate of dietary zeolite in pig feed at a percentage as follows: weaners and creep-feed 5%, growers 2.5% and breeders 1%.

Ken will continue to conduct research into the use of zeolites in agriculture on Gowrie EcoFarm. "I want to continue demonstrating that dietary natural zeolite in animal husbandry can be great for the environment and boost productivity," says Ken.

For more information contact Ken Crawford, KLC Environmental Pty Ltd, phone (02) 6743 4792, email: kencrawford@klcenviro.com.au.

Ken is the author of *Recycling waste nutrient in piggery effluent using dietary natural zeolite.*