A&M studies swine digestion

By MARTHA HOLLIDA

The old saying that a pig will eat anything may be true, but whether it can digest and put just anything to use for growth and performance is another matter.

Members of the Texas A&M University swine staff are conducting digestability trials on different protein sources to test growth and performance. This is currently the only place in the United States for this type of research.

"What we're essentially doing is measuring the actual digestability of different proteins in a pig. We measure how much protein is taken in and absorbed, said Dr. Darrell Knabe, assistant professor of animal science.

This is done by a surgical technique of placing a 5-inch T-shaped plastic tube, a cannula, at the end of the small intestine, the terminal illeum.

"The cannula is placed here because the only place the pig can absorb amino acids is in the small intestine. Once amino acids pass this point and move into the cecum and colon, they are changed to other forms and broken down into ammonia, which is of no benefit to the pig," he said.

An incision is made in the side of the pig at the cecum. The cannula is placed in the top of the intestine and a hole the size of the cannula is bored through the muscle and peritoneum layers about 3 inches above the incision. The cannulated portion of the intestine is then placed back inside the incision and pulled by forceps through the hole. The incision is then sewn shut.

A research trial consists of six crossbred barrows.

"We use barrows because the feces and urine can be kept separate," Knabe said.

The pigs are cannulated at about a 50-pound weight and are evaluated for 45 days. A trial is divided into three periods.

"We have three diets and there are two pigs to a group in a trial. So, each group is fed a different diet each period over the 45-day evaluation," Knabe explained and added that this way each group received all three diets. Each period consists of a five-day adjustment period, five days of fecal and urine collection, two days of rest and then three days of illeum collection.

The hogs are fed twice a day at 6 a.m. and 6 p.m.

On illeum collection days, a 90-degree elbow is placed at the end of the normally capped cannula. Plastic tubing is placed on the end of the elbow, which is connected to a jar held in an ice bath.

The digesta flows out by the natural force of gravity through the cannula and tubing into the jar. The digesta is collected for 12 hours during the day for three consecutive days in each period. It is then evaluated and calculations are based on the amount of ration fed, the fecal and urine collection and the illeum collection.

For example, if a pig is fed a 10-pound soybean meal ration, and 2 pounds of are protein are collected in the feces and urine and 8 pounds are absorbed and digested, then the pig is digesting 80 percent of the available protein.

"When we're collecting (illeum collection), it is just a sample of the digesta as it passes that point in the intestine. But, we're able to calculate the total digestion by this," Knabe said.

After the 45-day trial is over, the hogs are fed to market weight and slaughtered. The cannula is left in the intestine and capped. The cannulas are made at the cyclotron institute on campus and are used over in the research trials. The research was started in 1971 and around 60 barrows have been tested by various graduate students.

"Whoever does the trial does the surgery," explained Lynne Boggs, a graduate student in swine nutrition.

Boggs is conducting a trial this semester.

"It takes about two hours per hog to insert the cannula and we're supervised by Dr. Thomas Tanksley, extension swine specialist, and Dr. Knabe," she said.

"In a fecal and urine collection, the amount of protein absorbed can be calculated, but we don't know how much of this absorption takes place outside of the small intestine in the cecum and colon. Whereas, in the cannulated pigs we can calculate the amount the pig actually used," Knabe explained.

The three rations fed to the cannulated pigs are of meat and bone, soybean and cottonseed protein sources.

Knabe said the protein source content of the ration is based on the amount of the amino acid, lysine. If lysine is sufficient in a ration, then all other amino acids are usually adequate.

"Different digestability levels determine different gain and performance levels," Knabe said.

The same amount of lysine is present in the different rations but research up to this point shows that soybean meal has an 83 percent digestability level and meat and bone meal 60 percent.

"So far this is all theory. We're now ready to feed diets in growth trials based on this research to see if the values apply," he said.

And if so, it could mean that the producer out on the farm could increase performance levels and decrease feeding costs by feeding rations based on protein digestability and not just the amount of protein, Knabe emphasized.

Researchers in Europe have been conducting hog cannulation experiments for a number of years evaluating mineral absorption and energy utilization.

Australian researchers have calculated that soybean meal used as a protein source provides 1.2 pounds per day gain, while that of cottonseed is only 1 pound per day in cannulated hog trials.

Similiar work in protein digestability will be started soon at the University of Kentucky and at the Meat and Animal Research Center in Clay Center, Neb.

Gary DuBois weighs a chick for a poultry science class in broiler production. About 200 chickens were raised in the class. As part of the class, students butchered the chickens and had a barbecue.

Poultry industry needs grads

By LIZ BAILEY

Chickens aren't all they're cracked up to be, because chickens don't just make more chickens. They also make big bucks.

The poultry industry no longer consists of "10 hens and a rooster" in the backyard. The poultry industry in the United States is "agribusiness at its keenest," said Dr. W. F. Krueger, head of the poultry science department at Texas A&M University.

Texas A&M is perfectly able to keep up with the demand for skilled graduates to work in the poultry industry.

Even though the poultry science department at Texas A&M is one of the smallest departments on campus, having about 60 students, it is one of the largest poultry departments in the nation.

Krueger said, the main reason Texas A&M has one of the largest departments in the United States is because, "Texas ranks among the top 10 states in commerical egg production, commercial broilers and turkeys and is one of only two states in the top 10 in all three categories."

Because poultry has become a large and intricate industry, students in poultry science take business courses as well as poultry science courses.

"We think it's important that the student understand the bird as well as understand the business," Krueger said. "When our graduates go out, they know how to use their hands as well as their heads."

As far as employment goes, "The job opportunities have been excellent," said Krueger. Now, poultry researchers are needed particularly in the area of nutrition.

Besides nutrition, poultry science graduates are qualified to be hatchery managers, poultry farm managers and processing plant managers. Of the students who graduated last May in poultry science, not one is unemployed, he said.

Research studies possibility

By JANE LYON

The sun seems to be very popular these days with utilization of its energy for solar heating, solar cooling, solar-generated equipment and now a solar greenhouse.

Dr. Cornelius Van Bavel, who is with the Texas A&M University soil and crop sciences department, heads a solar energy research project involving a 250 square foot fluid-roof greenhouse.

Van Bavel explained that in a normal glass or plastic greenhouse, solar energy is trapped inside and must be removed to prevent overheating during the day. This is done by opening the greenhouse up and by the use of fans. Only when temperatures are very cold will all the radiation be used. When temperatures get too high, evaporative cooling is also necessary.

"Therefore, much of the solar energy collected by a conventional greenhouse is lost," Van Bavel said.

In a fluid-roof greenhouse, Van Bavel said he is using very thin, hollow-core roofing material that is filled with circulating copper chloride solution. The fluid absorbs the red and infrared radiation from the light spectrum of the sun and lets other light needed by plants through.

Van Bavel said the fluid is stored in a tank and heats up during the day, storing solar energy that would normally be wasted.

At night, this stored energy can be used to heat the greenhouse in place of artificial heat from fossil fuels.

"This is a completely different way of designing a greenhouse and has never been done before," Van Bavel said.

Van Bavel added that he is working in cooperation with a group of scientists in France who have actually built normal commercial-sized greenhouses to study using this method.

Design calculations, Van Bavel explained, showed that a greenhouse of this type would save on heating fuel during the winter and at night, and would save on ventilation needs during warm weather and clear days.

As a result of decreased ventilation, Van Bavel said the humidity in the greenhouse would be higher and plants would stay cooler.

Van Bavel said much research would still have to be made on the greenhouse before considering it for commercial or home use.

"We are growing grass in it now because it's easier to study," Van Bavel said. "Next year we'll have regular vegetable plants such as green peppers and lettuce."