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RAISING BROILERS WITHOUT  
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PLUS

LEADING THE PACK IN CANADA

LIGHTING AND COCCIDIOSIS VACCINATION

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THINK TWICE ABOUT AUTOGENOUS

A CONVERSATION WITH LANDMAN & PEEK

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NUMBER 11

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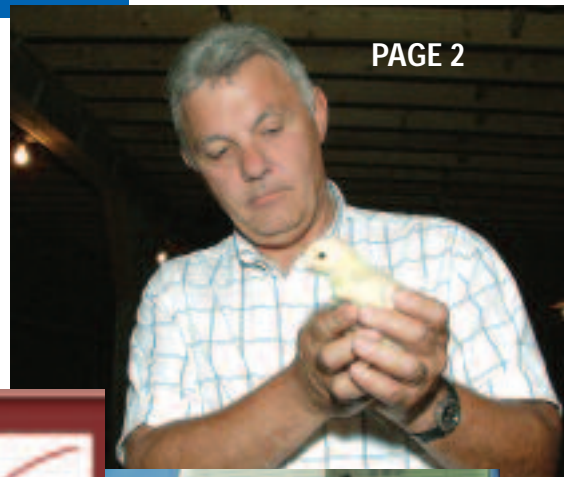


# COCCI FORUM

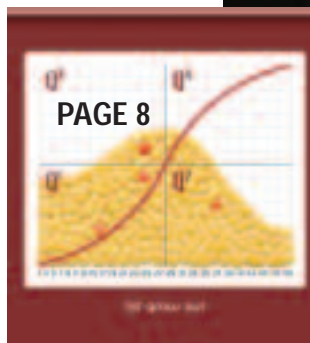
NUMBER 11

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*Cover: Dr. Mark Claeskens (left) and Dr. Willy Verdonck of Belgium got a 4-year head start on other EU producers raising standard broilers without antibiotic growth promoters or anticoccidials in the feed. Their story begins on page 14. Photo by Joseph Feeks.*

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## TOP DOG

Vision, innovation and an aversion to anything routine keep Dr. Rae Fischer well ahead of the pack

**D**r. Rae Fischer says that competing effectively in the poultry industry is a lot like pulling a dog sled across Canada's frigid Northwest Territories. "If you're not the lead dog," the veterinarian insists, "the view is always the same."



*Fischer: 'If you're not the lead dog, the view is always the same.'*

With that picture in mind, the owner and CEO of Fisher Feeds, Listowel, Ontario, says he loathes complacency and is always ready to embrace new products and technologies that will help his family's poultry operation and feed customers operate more efficiently, profitably and responsibly.

"I practiced veterinary medicine for 17 years and, in that time, I worked with some very good practitioners —

the kind that always wanted to be up-to-date on everything," he recalls. "They were clear thinkers, and very aggressive in utilizing new technology and being the best they could be. For me, that was the fun part. Routine things tend to be routine."

Fischer admits that raising birds and making feed are activities that require attention to detail and dependence on routine procedures. "But, trying to improve and discover new ways of doing things are what get me out of bed in the morning," he explains. "It doesn't cost any more to feed a good horse. Likewise, it doesn't take a whole lot more to be the best producer, or at least as good as you can be. I believe that has to be our goal."

### 'Nimble and quick'

Fischer's business, which he runs with son Matthew, is based about 100 miles northwest of Toronto. Fisher Feeds produces approximately 100,000 tons of feed per year; 65% is for poultry and the rest is for swine. Half of the poultry feed is sold to area producers. The rest is used by his family's poultry operation and its associated contract farms, which together place about 1 million broilers every 9 weeks. Fischer's birds are separated by sex. Cockerels are grown to 2.6 kg (5.73 lbs) in 41 days, and pullets reach 2.4 kg (5.30 lbs) in 42 days.

Fischer thinks it's important for his operation to be "nimble and quick" with decision-making so it can take advantage of new things that come along.

*Editor's note: Dr. Rae Fischer and his company, Fisher Feeds, have similar names, but they are spelled differently.*

“If we see something that we think is really good — a new additive or health product, for example — we move on it quickly without a lot of bureaucracy. We’re constantly trying new and better ways of doing things, sometimes to the frustration of our feed mill manager. We can find out what works in our own facilities and then share it with our customers.”

The latest example of that commitment is Fisher Feeds’ approach to coccidiosis management. For years the company relied on in-feed products, a natural complement to its feed business. But Fischer, drawing on his veterinary background, was not convinced that medicated feed was the best way to keep the persistent disease in check and decided to introduce vaccination into the coccidiosis control program.

For one thing, there have been reports from around the globe that the *Eimeria* organisms that cause coccidiosis have developed resistance due to prolonged use of in-feed anticoccidials.

“We’ve done some sensitivity studies, and I don’t believe we have seen resistance in our facilities, but we have seen some feed medications and chemicals lose their effectiveness over time. I have also seen farms where there is resistance, and I know it’s a very real problem,” he says.

### Meeting consumer demand

There were also regulatory and consumer issues to consider. While Canada shares a 3,000-mile border with the United States, the world’s largest broiler producer, poultry-production practices and consumer attitudes in Canada are much closer to those in Europe, Fisher says.

“We’ve got a tremendous European influence in this country, so in terms of production trends, I think we need to look at the ban on antibiotic growth promoters in Europe [effective January 1, 2006].

“As a veterinarian, I want to see these decisions made on science, not emotion or propaganda. But either way, if that’s what the consumer wants, somebody’s going to have to produce it. We need to be ready for drug-free production, and that’s one of the reasons we wanted to start vaccinating.”

Initially, Fischer didn’t see any big financial incentives for initiating vaccination, which stimulates immunity against coccidiosis by delivering a controlled dose of live *Eimeria* oocysts to birds. He knew from published reports that vaccinated broilers performed as well or better than medicated birds. At the feed mill, he was told there was some concern about lost revenues from



*Fisher Feeds’ feed mill in Listowel, Ontario. While Canada shares a 3,000-mile border with the US, poultry production practices and consumer attitudes are much closer to those in Europe.*

the sales of coccidiosis medications. Still, Fischer wanted to move ahead with his plan.

“This may sound funny coming from someone who owns and operates

*continued on page 24*

## SHEDDING LIGHT ON SPRAY CABINET VACCINATION

Studies show light and color can impact coccidiosis vaccine performance

Sometimes, nature really does know best. And in a modern hatchery vaccinating birds for coccidiosis, light and color can be important tools for maximizing distribution of vaccine oocysts and ensuring broad protection.

Since it was launched in late 1997, hatchery spray administration of Schering-Plough Animal Health's coccidiosis vaccine lines, Coccivac and Paracox, has proved to be a fast, inexpensive and effective way to immunize broilers, breeders and layers against coccidiosis.

Unlike other spray-administered vaccines that enter the birds' system, either through the eye or respiratory tract, coccidiosis vaccine must be ingested for an optimal intake and colonization of the intestinal tract. While the spray cabinet method is undoubtedly effective, understanding *why* it is effective — what stimulates the chicks to preen and ingest the vaccine they've sprayed with — is an extremely useful hatchery-management tool.

A series of three trials carried out at Texas A&M University provided some important insights, and shows that natural responses of chicks can be harnessed to ensure optimal uptake of spray cabinet-administered vaccine. The research,<sup>1</sup> published in 2001, was supervised by Drs. Billy Hargis and David J. Caldwell, faculty members of

the Departments of Poultry Science and Veterinary Pathobiology at the university.

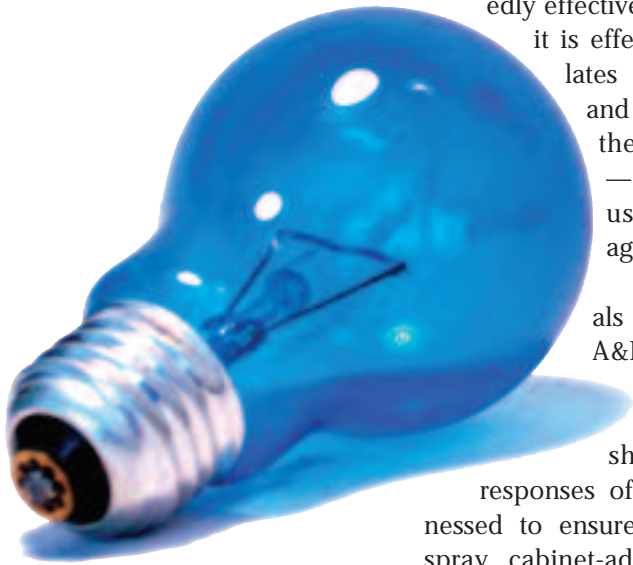
Conducted under laboratory conditions, the first trial looked at the effect of manipulating sound, temperature and light. While changes in all three stimuli could be manipulated to increase preening behavior, changes in light levels, or photointensity, made the biggest impact.

Caldwell says the responses of the chicks were very much as expected, given what is known about their behavior.

Changing ambient sound levels from 83 dB before spraying to 56 dB at spraying and for 5 minutes following had the effect of increasing the amount of preening. So too did increasing the temperature from 20°C (68°F) before spraying to 35°C (95°F) during spraying and for 5 minutes after the vaccine had been applied.

Under commercial conditions, controlling levels of sound and temperature like this may not be practical. However, changing lighting conditions — an easier practice for most hatcheries — gave the most marked response.

In the first Texas A&M trial, photointensity was increased from 0 lux (complete darkness) to 1,243 lux (115.5-foot-candles) — about the same level as a mechanic's workshop or operating room — at the time of spraying. This lift in photointensity tripled or quadrupled preening events. The trial showed that a brief period of total darkness (less than 2.5 minutes) followed immediately by spray applica-



## Aviagen puts photointensity results into practice

Aviagen, a leading poultry breeder based in Huntsville, Alabama and Newbridge, Scotland, has successfully captured the benefits identified by Texas A&M University's

preening behavior research in its coccidiosis vaccination program.

The company, which supplies broiler breeder chicks to more than 85 countries worldwide, routinely vaccinates day-old chicks with Coccivac. Quick to see the advantages of the spray cabinet system, Aviagen introduced

spray cabinets about 5 years ago — for the application of Coccivac-D.

Dr. Bill Stanley, director of Quality Assurance for Aviagen, says the technology applied to coccidiosis vaccination fits well with the company's drive for system-wide standardization. Aviagen achieved ISO 9001 registration (the international standard for quality management systems) in June 2005.

Stanley says the company successfully applied Texas A&M's findings to its own hatchery operations during February and March 2004, and the use of increased lighting has been established for about a year.

"We haven't done any external trials to quantify the success of introducing increased lighting, but internally, the results have been positive," he says.

tion in a strong light and maintained for a period afterward, can have very positive effects on preening behavior.

But conversely, putting chicks into dark conditions straight after spraying could have the reverse effect. In commercial hatcheries, where trays of

chicks could be stacked straight after vaccine spraying, this is possible. This could lead to decreased preening activity and a consequent reduction in vaccine ingestion.

Other studies, conducted under commercial hatchery management con-

"You can see an increase in preening activity under the intense lighting, which improves uptake and distribution of the coccidiosis vaccine."

Applying the results from lab-based trials into a large-scale commercial operation took some working out, Stanley says, but ultimately the solution was fairly straightforward.

"We developed a system of rollers in a series long enough to accommodate about 10 boxes of chicks at a time," he explains. "The rollers are on a slight decline, so the operator doesn't have to force them through. There are fluorescent lights over the rollers, and the chicks are exposed for about 6 minutes after they've been in the spray cabinet."

Precise levels of photointensity aren't crucial, but as a general rule, the chicks would be exposed to about the same illumination found in a well-lit office — perhaps around 1,000 lux (93-foot candles).

Stanley cautions: "Spreading the chick boxes out during the 6-minute period should be done in an area free of drafts to avoid chilling of chicks."

Introducing fluorescent lighting to enhance preening and vaccine uptake has been a success for Aviagen, Stanley concludes. "The improved preening response, and improvements in vaccine uptake, have made the change well worthwhile for us."



*Aviagen's Dr. Stanley: Introduction of lighting to encourage vaccine uptake well worthwhile. 'The results have been positive.'*



*Chicks at an Aviagen hatchery receiving their 6-minute burst of light following spray cabinet vaccination*

ditions, have evaluated other photointensity regimes that could be implemented more easily in a day-to-day setting. Encouragingly, these trials have shown that it may not be necessary to put the chicks into total darkness prior to spraying.

## **Lighting up days 1 to 4 shows benefits**

Turning up the lights can do more than increase the uptake of spray-administered coccidiosis vaccine.

An Italian trial, looking at the effects of different light intensities during the first 4 days of life on the productivity and health of broilers vaccinated with Paracox-5, also showed several performance benefits from elevated light levels. By 49 days, the group raised in higher light levels to day 4 showed superior early growth rate, livability and flock uniformity. They also showed lower overall mortality and reduced incidence of intestine bacterial overgrowth.

Although it is too early to translate these trial results into firm recommendations for producers, the research underlines the importance of light levels for behavior and productivity.

This Italian trial, showing the benefits of correct light intensity in the first few days of life for birds vaccinated against coccidiosis, confirms earlier Schering-Plough research into the relationship between intestinal health and management.

This fits with the Quadrants of Performance concept, developed by Schering-Plough's Technical Services team. (See article, page 8.) The concept has been widely accepted by the industry as proving the importance of developing early and predictable immunity, allowing the birds to express their maximum potential for growth and feed efficiency.

On the other hand, without the protection of vaccination, late intestinal challenges — a consequence of poor drug efficacy or resistance — can compromise performance and profits.

Using light intensity with spray cabinet vaccination, leading to an adequate vaccine uptake, will favor the establishment of early immunity with all the benefits of good gut function in later growth stages.

This is consistent with the second Texas A&M University trial, in which chicks were taken from normal hatchery light levels of around 215 lux, exposed to a 15-second burst of intense

light (3,226 lux) during spray vaccination, and then held in elevated light levels of 1,075 lux for a period post-spraying. Preening activity was doubled in this trial.

Interestingly, this study also showed that if the 15-second period of intense light (created in the trial with portable halogen lights) was prolonged, the increased preening effect was lost. This was probably because the warming effect of the strong light made them sleepy, overwhelming the “wake-up” stimulus of the short burst of intense light.

Of course, day-old chicks aren't only responsive to light. Color plays a big part in their behavior, and the recommended practice of adding coloring agents to sprayed vaccine is well established. Not only does the color encourage preening, it also acts as a useful marker to confirm birds have been vaccinated.

Caldwell says a third Texas A&M trial looked at the impact of color on preening behavior. Colors throughout the spectrum, including fluorescents, were tried under a constant 990 lux before, during and after spraying.

The addition of colors under constant light levels stimulated a 2-fold to 3-fold increase in preening. Blues and greens showed the strongest effects, but the red used in the study (approved for use in Paracox-5 as Cochineal E120) was comparable, Caldwell says.

The light source (fluorescent versus incandescent) made no appreciable difference to the preening activity when different colors were being trialed.

Probably the most significant finding was that when coloring agents were added to the spray under conditions of increasing photointensity, it made no difference to the increase in preening behavior made possible by light alone.

That finding is a very important one for commercial hatcheries. It shows there is real flexibility when it comes to

*continued on page 15*



## AUTOGENOUS VACCINES SHOULD BE BACKED BY SAFETY, EFFICACY DATA

The merits of autogenous coccidiosis vaccines should not supercede the need for data demonstrating safety, efficacy and quality, according to renowned coccidiosis expert Dr. David H. Chapman of the University of Arkansas.

After he presented a paper at the IX International Coccidiosis Conference in Brazil, Chapman talked with *CocciForum* to provide additional insights about coccidiosis control.

On the topic of autogenous vaccines, Chapman says, "Just because a vaccine is derived from your own chickens doesn't necessarily mean that it's safe or effective.

"It is theoretically true that a vaccine, unlike most drugs, may be appropriate and effective in one place but not another, and that local requirements need to be consid-

ered, which autogenous vaccines do. However, I'm most concerned about quality-related issues."

There are good reasons for the rules and procedures required to make licensed commercial vaccines, and you can't "jump the gun," he says.

"If autogenous vaccines have gone through the same rigorous critique that is applied to licensed commercial vaccines, then I have no problem with them. My concern is that autogenous products usually are not subjected to the same standards, and you just can't get away from the need for data."

The poultry industry, he says, has a right to know that what they're buying is safe and, of course, effective. "And if the data isn't there, they have no way to know. That does the poultry industry a disservice," he adds.



*Chapman: 'You just can't get away from the need for data.'*

## AAAP REPORT LINKS MYOPATHY TO MONENSIN FED AT RECOMMENDED LEVELS

Skeletal muscle degeneration from monensin, an ionophore antibiotic used to treat coccidiosis in chickens, can occur even when the drug is used at recommended levels, Dr. Scott D. Fitzgerald said in a presentation at the 2005 annual meeting of the American Association of Avian Pathologists.

A number of conditions in chickens have been associated with skeletal muscle degeneration, also known as myopathy. These include vitamin E or selenium deficiency, exertional stress and ionophore antibiotic toxicity, said Fitzgerald, a veterinary

pathologist with the Diagnostic Center for Population and Animal Health, Michigan State University.

"We report several cases of ionophore myopathy in chickens associated with the feeding of recommended levels of monensin," he said. Histologic findings were most prominent in the thigh and leg muscles.

The development of myopathy even when monensin was fed at the recommended level was probably due to improper mixing of the feed, interaction with other antibiotics or insufficient antioxidants within the feed, Fitzgerald said.

*More CocciNews on page 15.*

# WHAT QUADRANT ARE YOU IN?

Veterinarians present a visual guide to managing coccidiosis

**Y**ou've been successfully using ionophores to control coccidiosis, but lately performance in your broilers just doesn't seem as good as it used to be. You want to try switching to a new program, but can't decide whether to try a chemical-to-ionophore shuttle or a few rounds of coccidiosis vaccination.

How will you know what to expect with different programs? And how can you get the best coccidiosis control as well as optimum growth in birds?

A new concept known as the Quadrants of Performance may be just what you need to understand and help predict the impact of various anticoccidial strategies on broiler performance.

"The Quadrants of Performance concept is a visual tool demonstrating the effects of anticoccidial control programs and a pathway for achieving improved outcome and cost effectiveness," says Dr. Charlie Broussard, director of global technical services for the Schering-Plough Animal Health Corporation's Poultry Business Unit.

*The Quadrants concept goes beyond the simple 'pass/fail' system. It considers **when** coccidiosis control has an effect on the growth curve.*

Developed by coccidiosis specialists at Schering-Plough Animal Health, the concept is based on published and non-published work on oocyst cycling in chickens, as well as the company's extensive worldwide experience managing coccidiosis, the costly protozoan disease that threatens commercial poultry operations worldwide, he says.

## Basic graph

The Quadrants of Performance concept starts with a basic graph that plots two major thresholds (Figure 1):

- Level of infection, illustrated by a horizontal line
- Age of infection, illustrated by a vertical line

The graph also provides a way to illustrate the broiler growth curve, with the ideal curve being the optimal growth and rapid weight gain possible for modern broilers.

"The basic graph is then used to illustrate the process of various anticoccidial programs," Broussard says. "We have plotted real-world experience and feel confident that the Quadrants provide a good approximation of what to expect with each type of anticoccidial program. It takes a lot of guesswork out of anticoccidial control."

The Quadrants of Performance concept is based on the premise that, at some point during coccidial exposure, there is an age threshold that affects performance markers such as feed conversion, weight gain, caloric conversion, thriftiness and mortality.

During Quadrant 1, for example, when growth is slower, the impact of coccidial exposure is minimal. "Quadrant 1 is a time of early, slower growth with coccidial challenge that is below the horizontal threshold, so the impact on performance is minimal," Broussard says.

"A coccidial challenge in Quadrants 2 or 4 is quite another matter," he says, "because these are times of rapid growth and a coccidial challenge can seriously impair the growth rate."

The worst-case scenario is a coccidial challenge during Quadrant 4,

when the growth curve is strong. “You’re to the right of the vertical threshold and above the horizontal threshold,” Broussard says.

### Not just a ‘pass/fail’ grade

Poultry veterinarian Dr. Linnea Newman, a consultant for Schering-Plough Animal Health, says the Quadrants concept encourages poultry integrators to examine how their current coccidiosis control program interacts with the broiler growth curve.

“As things are now, the industry thinks of coccidiosis control in terms of a simple pass/fail grade. Each week, feed conversion is assessed and a conclusion is made about whether the program is either working or not. This approach can lead to knee-jerk program changes when performance slips,” she says.

The Quadrants concept goes beyond the simple “pass/fail” system. It considers when coccidiosis control has an effect on the growth curve. “You can have an overall passing grade on total coccidiosis control but could actually be leaving dollars on the table because your passing grade is really only a C+,” she says.

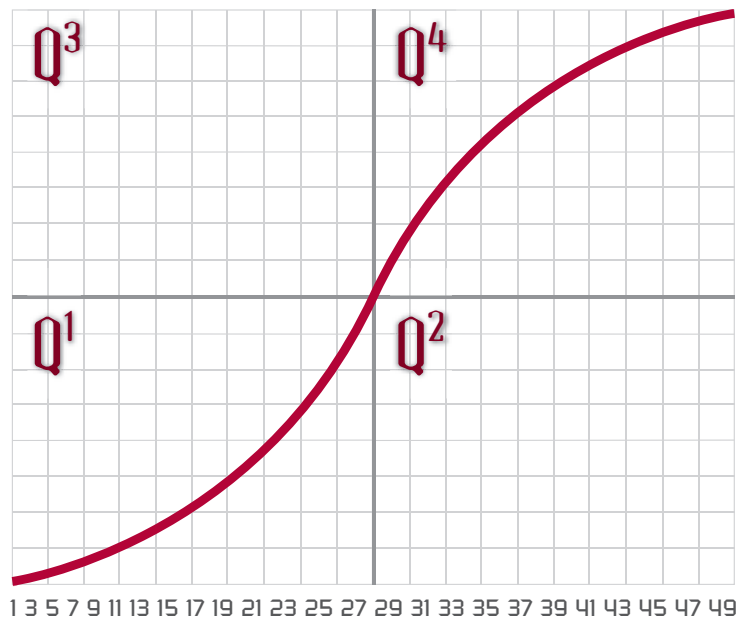
In addition, the Quadrants concept encourages integrators to look at how performance in today’s flock affects subsequent flocks and to aim for a solid grade “A” performance, Newman says.

### Ionophore programs

As an example, Broussard cites experience with ionophores, which rely on oocyst “leakage” to stimulate the chicken’s immune system against coccidial challenge. In situations where there is a high coccidial challenge as determined by the oocyst litter count and intestinal lesions, the peak challenge shifts with time to Quadrant 2, the same time when the growth curve and opportunity for maximal meat production is increasing. (See Figure 2.)

Continued use of ionophores can result in the selection of ionophore-tol-

Figure 1. The Quadrants of Performance



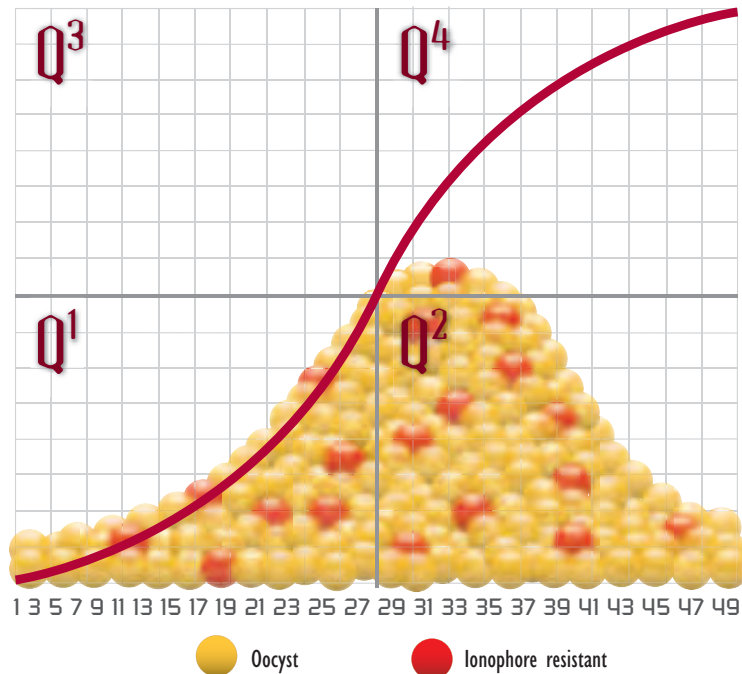
### Understanding the Charts

- The horizontal bar on the graph plots the level of infection as it relates to performance.
- The vertical bar plots the timing of infection as it relates to performance.
- The two bars form the four quadrants.
- Specific ages, which also represent the time of infection, are shown along the bottom of the graph.
- The red line moving through the graph represents the optimal performance growth curve.

erant coccidial strains, which make the anticoccidial program less effective. “Increased oocyst leakage can compromise the next flock through heavy carry-over of sporulated oocysts. Ionophore-tolerant coccidia strains may become hard to control, resulting in poor feed conversion and weight gain and increased production costs,” he says.

Ionophores on farms with a low coccidial challenge result in slow development of coccidial immunity, Broussard says. Initially, results may be satisfactory if the coccidial challenge remains low but, with time, the peak challenge shifts to Quadrants 2, 3 and

Figure 2. With ionophore-to-ionophore programs and a high coccidial challenge, peak challenge over time shifts to Quadrant 2, the same time the growth curve is increasing.



4, resulting in ionophore-tolerant coccidial strains and a less effective anticoccidial program.

“Continuous oocyst leakage can slowly increase the number of oocysts carried over to future flocks, and it’s not uncommon in these situations to see performance slowly deteriorate. You may not even realize it’s happening but, eventually, production costs start creeping up as the peak oocyst challenge shifts to Quadrants 2, 3 and 4,” he says.

Newman agrees and says, “High oocyst numbers at the end of one flock means that the next flock will have a bigger coccidiosis challenge and more resistant oocysts challenging the next coccidiosis control program.

“If I have 10% resistant oocysts, and I carry over 100 oocysts, it means that I have a grand total of 10 resistant oocysts in my house. If I have the same 10% resistant oocysts and I carry over 100,000 oocysts per gram of litter to the next flock, I have 10,000 resistant oocysts *per gram of litter*. That’s a big

challenge to the next program and contributes to program failures.”

### Chemical and ionophore programs

The course of events is similar with chemical-to-ionophore programs, Broussard says. When anticoccidial chemicals are used in the starter feed, oocyst shedding is pushed to Quadrant 2, that critical growth period. Ionophore leakage may allow the number of chemical-resistant coccidia to grow. High numbers of residual oocysts challenge the efficacy of the ionophore starter in the next rotation.

With chemical-to-chemical programs, the situation changes somewhat. Initially, chemical anticoccidials appear to be very effective. They shut down oocyst shedding in the house and reduce peak coccidial challenge to very low levels during Quadrant 1. But drug resistance can build up fast and shift the peak oocyst challenge to Quadrant 3, due to a quick selection of strains that are resistant to chemical anticoccidials.

“Initially, we see dramatic improvement in performance after switching from straight ionophore programs to a chemical-to-chemical program,” Broussard says. “But then drug resistance appears after one or two grow-outs, and clinical coccidiosis results. Flock performance is compromised and production costs rise.”

“We have learned that if you’re in Quadrant 2, 3 or 4, performance may be suffering either slightly or severely, and changes need to be made,” he says.

### Coccidiosis vaccination

Experience in the field with coccidiosis vaccines such as Paracox-5, which initiates life-long immunity against coccidiosis in chickens, has shown that vaccination results in an early, mild predictable pattern of reaction in Quadrant 1, before the fastest growth spurt kicks in, Broussard says. (See Figure 3.)

Coccidiosis vaccination can be used exclusively for coccidiosis control or integrated into other anticoccidial programs. Research shows that Paracox vaccines seed houses with drug-sensitive oocysts, increasing coccidial sensitivity to ionophores and chemical anticoccidials, he says.

“Either way, vaccination can help producers raise flocks that have the ability to realize their full genetic potential, as shown in the Quadrants of Performance,” Broussard says.

### Intestinal health

Performance in vaccinated birds can be improved, Broussard continues, with management and nutrition. Toward this end, Schering-Plough Animal Health has developed the IDEA concept, a novel nutritional plan for vaccinated birds. It promotes good nutrition early in life when the digestive and immune systems are developed and coccidial challenge is low. The result, he says, is healthy gut development in birds that depend on immunity rather than drugs.

“Resistance to intestinal disease is better and so is performance for the rest of the bird’s life,” Broussard says.

When coccidial replication in vaccinated birds reaches its peak, the IDEA concept encourages the use of a highly digestible diet to further maximize intestinal integrity.

“Improved digestibility reduces damage to the enterocytes and reduces the availability of nutrients for bacterial growth,” he says.

With intestinal immunity established, vaccinated birds can express their maximum potential for growth and feed efficiency. IDEA is also economical because it enables feed cost savings, Broussard adds.

### Conclusion

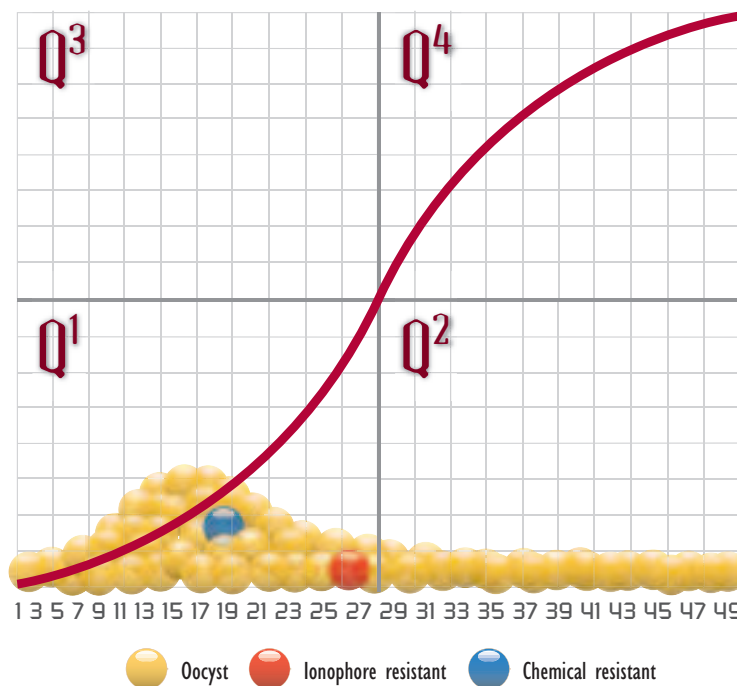
Says Newman: “The best overall control program induces early immunity that creates low oocyst numbers at the end of the flock and minimal carryover to the next flock. Low oocyst numbers

means less total challenge on new chicks in the next flock and less potential for developing a significant population of resistant oocysts for future flocks.”

Early immunity, Newman notes, also creates in-house “down time” — no coccidiosis activity, just as though the house was empty — from 25 days of age on. “It’s like getting an extra free week or two of layout time in terms of coccidiosis control,” she says.

Broussard says, “As the saying goes, ‘knowledge is power’, and the Quadrants of Performance concept gives us more knowledge. It provides a thorough understanding of each anticoccidial rotational cycle and its impact on subsequent rotational cycles, making it an innovative and valuable tool that can help poultry integrators assemble highly effective annual anticoccidial control programs with the few remaining approved products left on the market today.”

**Figure 3. Vaccination against coccidiosis initiates an early, mild, predictable pattern of reaction that occurs during Quadrant 1, when growth is minimal, and resulting in a minimal impact on performance.**



## SCHERING-PLOUGH'S TECH SERVICE TEAM ANSWERS QUESTIONS ABOUT MANAGING COCCIDIOSIS IN BROILERS



Charles Broussard, DVM

**Q.** AFTER USING COCCIVAC-B OR PARACOX-5 ONE OR TWO TIMES, ARE THERE ENOUGH OOCYSTS IN THE LITTER TO STIMULATE NATURAL IMMUNITY WITHOUT VACCINATION OR WITH A REDUCED DOSE?

**A.** No. While it's true that oocysts are in the litter, reliable immunity will only be achieved by giving each bird a controlled, balanced dose of *Eimeria* organisms through vaccination to all new flocks.



Steve Fitz-Coy, PhD

**Q.** WHAT IS THE EFFECT OF IN-FEED ANTI-COCCIDIALS ON BIRDS THAT HAVE BEEN VACCINATED AGAINST COCCIDIOSIS?

**A.** If in-feed anticoccidials are used before *Eimeria* organisms become established, the number of oocysts replicating in birds can be reduced significantly. The result will be less than optimal immunity against coccidiosis.



Delair Bolis, DVM

**Q.** IF CHICKENS COME FROM TWO SOURCES AND SOME ARE VACCINATED AND SOME ARE NOT, WHAT DO YOU DO?

**A.** Go back and revaccinate. An alternative would be to vaccinate just the birds that had not been vaccinated earlier, even if this requires segregating and confining those birds for a day or two in a small area. Then they could be mixed

with the rest of the bird population that was already vaccinated.

**Q.** IS VACCINATION WITH COCCIVAC-B OR PARACOX-5 EFFECTIVE ON FARMS THAT ALREADY HAVE COCCIDIOSIS OR WHEN THERE ARE HIGH LEVELS OF OOCYSTS IN THE LITTER?

**A.** Yes. If birds are vaccinated on day 1, the organisms established during the first week of life tend to take up residence. These infections do not prevent or eliminate wild oocysts in the environment that affect chickens, but oocysts from the vaccine tend to dominate early infections. Thus, the impact of wild oocysts isn't as severe.

Giving birds the initial exposure is very critical because the subsequent exposure will be less severe. If non-vaccinated birds are, say, 10 days old, and they're just getting their initial exposure to wild coccidia through ingestion of organisms, the amount they get is uncontrolled. With vaccination, that first exposure is controlled. That's why we advise hatchery vaccination on the first day for Coccivac-B and Paracox-5, because it allows birds in your system to start responding to the antigen.

**Q.** DOES THE TYPE OF LITTER MATERIAL INFLUENCE VACCINATION WITH COCCIVAC-B OR PARACOX-5?

**A.** The quantity probably has more impact than the type of material. We've seen coccidia in all types of litter. The thicker the depth of the litter, the more

diluted will be the fecal matter, and the reverse is also true. It is best to have a thick, rather than thin, layer of litter. Litter material should be high capacity to absorb humidity.

**Q.** IF YOU ARE USING COCCIVAC-B OR PARACOX-5 AND WANT TO SWITCH TO ANTICOCCIDIALS, WHAT KIND OF ANTI-COCCIDIAL PROGRAM IS NECESSARY?

**A.** Based on our experience, any of the anticoccidials should work if you use the vaccine long enough, because the organisms from the vaccines are sensitive to several anticoccidial drugs.

**Q.** IS THERE A BEST TIME OF YEAR TO USE COCCIVAC-B OR PARACOX-5?

**A.** The vaccines can be used at any time of year. There is a producer in the Southeast United States and several companies in Europe that have been using the vaccine year-round for several years with excellent success. The key is proper management of factors such as bird density and litter moisture.

**Q.** WHAT ARE THE PROS AND CONS OF THE MAJOR IN-FEED ANTICOCCIDIALS FOR SHORT- AND LONG-TERM COCCIDIOSIS CONTROL?

**A.** Chemical or synthetic anticoccidials are highly effective when they're first used.

Unfortunately, *Eimeria* organisms can develop resistance to them fairly quickly, so you can use them only for one or two cycles.

Resistance is also a problem with ionophore antibiotics, but it appears to happen more quietly and gradually. In

some ways, however, that can be more costly than a total product failure because the production losses are not as apparent, even though they may still be significant.

Rotating ionophore antibiotics can help slow this resistance, but the impact may be minimal because the ionophores are all similar compounds and there is cross-resistance among them; that is, strains of coccidia that become resistant to one ionophore drug may become resistant to others as well.

Vaccinating for coccidiosis for three or four cycles can help break up the cycle of resistance and restore sensitivity to in-feed anticoccidials.

**Q.** WHY DON'T I SEE ANY CLINICAL SIGNS OR IMPAIRED PERFORMANCE AS A RESULT OF LEAKAGE AND RESISTANCE IN AN IONOPHORE PROGRAM?

**A.** You *are* seeing impaired performance, it's just not being quantified. Impaired performance due to leakage — when some *Eimeria* oocysts survive initial treatment and then begin to multiply and reinfect birds — is not always revealed by the benchmarking methods used by some poultry companies. If impaired performance is related to *E. maxima* late in the grow-out, there may be no clinical signs, but there will be microscopic evidence of subclinical coccidiosis.

Unfortunately, many producers don't see the shortfall in performance until they switch treatment methods and experience a performance gain. Poor performance due to leakage and resistance often improves with vacci-



*Luciano Gobbi, DVM*



*Matilde Alfonso, DVM*



*John Radu, DVM*

nation, which initiates early coccidial cycling, helps build immunity and lowers the oocyst carryover load in subsequent flocks.

**Q.** WILL SHUTTLING IN-FEED ANTICOCCIDIALS — FOR EXAMPLE, USING A CHEMICAL IN THE STARTER PHASE AND AN IONOPHORE ANTIBIOTIC IN THE GROWER PHASE — REDUCE RESISTANCE TO IN-FEED ANTICOCCIDIALS BETTER THAN SIMPLY ROTATING PRODUCTS WITH EACH FLOCK?

**A.** No. The more often you put an in-feed anticoccidial product in front of *Eimeria* organisms, the more potential there is for resistance to develop. The unfortunate part of a shuttle program is that you can develop resistance to anticoccidials.

**Q.** AFTER REPEATED USE OF COCCIVAC-B OR PARACOX-5, CAN I START VACCINATING WITH A HALF-DOSE SINCE THE POULTRY HOUSE IS NOW SEEDED WITH OOCYSTS FROM THE VACCINE?

**A.** Definitely not. It is critically important to use a full, controlled dose to ensure uniform distribution. Half-dosing increases the risk that some birds won't get enough of the vaccine and some may not get any.

Unvaccinated or inadequately vaccinated birds will not experience oocyst

cycling or develop immunity at the same time as vaccinated birds, and they can develop significant reactions upon exposure to coccidia. In addition, there is a balance between different *Eimeria* species; a certain number of one species — say *E. acervulina* — helps reduce the multiplication of another species — say *E. maxima*.

If a half-dose is administered, this balance can be disrupted and uneven multiplication of *Eimeria* parasites may occur.

**Q.** WHY AREN'T MORE COMPANIES USING COCCIVAC-B OR PARACOX-5 IF IT'S SO GOOD?

**A.** Vaccinating for coccidiosis represents a big change in the way that poultry companies have controlled coccidiosis. Coccivac-B and Paracox-5 have been shown to be effective and safe products. In fact, industry data show that when live performance is measured, the vaccine is comparable, if not better, than standard in-feed anticoccidial programs

However, it's difficult to convince people to try something new; that's the reason more companies haven't yet switched to Coccivac-B or Paracox-5.

So far, many innovative companies have successfully adopted Coccivac-B or Paracox-5 as part of their long term anticoccidial strategy. As more companies recognize the losses associated with ionophore oocyst "leakage," they will likely adopt vaccination.







## **Lights, camera, chicken!**

*Coccidiosis specialist Dr. Steve Fitz-Coy (left) leads a mesmerizing wet lab held in conjunction with the IX International Coccidiosis Conference in Brazil last September. With a camera man standing over his shoulder, Fitz-Coy necropsied chickens challenged with various coccidial organisms while his captivated audience watched on a large screen. For a free DVD of the wet lab, complete and return the reply card that accompanies this issue of CocciForum. Offer limited while supplies last.*

*continued from page 6*

maximizing the uptake of coccidiosis vaccines applied using a spray cabinet:

- Where use of coloring agents in spray cabinet vaccination is established as part of the routine, these trials show that the preening activity will be enhanced, even under constant lighting.
- Where use of coloring agents is not practiced, then manipulation of photointensity alone can stimulate preening to a level even greater than that achieved through coloring agents.
- Where a coloring agent is regularly used in combination with increased photointensity during and following spray cabinet vaccination, preening activity and vaccine intake are still enhanced.

## **Early start = good start**

Adequate lightning will stimulate the birds to consume not only the sprayed vaccine, but also feed and water in their first hours after hatching. The earlier feed and water come into contact with the intestinal tract, the better the development of the villi and enterocytes.

This link has been highlighted by several researchers in trials around the world and is one of the foundations of the "I" in the IDEA concept — a novel nutritional approach for birds vaccinated against coccidiosis (see *CocciForum* No. 8: page 17). The concept's "I" is for Impulse — the early phase following vaccination that prepares the immune system and intestinal cells, while providing a good start for the fattening period.

## **Reference**

- <sup>1</sup> *Journal of Applied Poultry Research*. 2001; 10: 99-106, 107-111, 112-116.

## BEEN THERE, DONE THAT

Belgium's Joosen-Luyckx has a 4-year head start raising standard broilers without in-feed growth promoters and anticoccidials

On January 1, when most European broiler producers were turning their calendars and fretting over anticipated performance losses following the new ban on antibiotic growth promoters, veterinarian Marc Claeskens and nutritionist Willy Verdonck were toasting their success in 2005 and looking forward to another good year for themselves and their contract hatcheries and growers.



*Claeskens and Verdonck: 'There are no proposed standards that we haven't implemented already.'*

They could afford to be nonchalant about the new antibiotic regulations because their company, Joosen-Luyckx

of Turnhout, Belgium, hasn't used an antibiotic growth promoter in their standard broilers or specialty birds for the last 4 years. For that matter, Joosen-Luyckx hasn't used anticoccidials in broiler feed, either.

"As far as I know, there are no other standards or proposed standards that we haven't implemented already," Verdonck says. "No growth promoters or anticoccidials in the feed, no animal protein, no animal fat, no genetically modified organisms. This is the trend in the poultry industry and, more importantly, it's what our retailers are demanding. They give us clear specifications — feed ingredients, weight, the number of birds per square meter, for example — and we have to meet them."

Joosen-Luyckx contracts with four local hatcheries and 80 growers to place about 150,000 birds a week. Half of these birds are standard broilers raised to 1.8 to 2.5 kg (3.97 to 5.51 lbs). The others birds are produced for specialty markets, including 7,000 Le Coucou de Malines, a traditional, indigenous, pure line known throughout Europe for its unique texture and flavor. All birds are slaughtered and marketed as whole chickens by Joosen-Luyckx's sister company, Belki.

"We are the only company in Belgium producing Le Coucou de Malines," Claeskens says. "So while the total number of birds from this line is small in comparison to the rest of our operation, Le Coucou is the most important for us in terms of recognition and reputation. Retailers associate our products with quality."

## Going drug-free

While Claeskens and Verdonck concede that the relatively small size of their poultry operation eased their transition to drug-free production, their experiences and ideas are of interest to producers of all sizes — not just in Europe, but anywhere poultry companies need to change production practices to meet new government regulations or growing consumer demand for birds raised without subtherapeutic drugs in the feed.

“As a nutritionist, I’m very happy about keeping drugs out of the mill,” Verdonck says. “We raise five different types of birds, all with different diets, so that can mean 20 to 24 different broiler feeds from start to finish. The ionophores are particularly difficult at the feed mill because they tend to stick to metal, so you have to rinse and rinse and rinse the whole system to make sure no residues get into other feed.

But even then, there’s always a risk that traces will get into the wrong feed.”

Adds Claeskens, “The authorities can measure drug residues up to 2 parts per billion and they have a zero tolerance policy, so I prefer to keep drugs out of the feed mill, too — not just out of the withdrawal feed, but out the entire facility.”

Joosen-Luyckx also takes extra precautions with its suppliers of feed ingredients. For example, they’ve asked their vitamin supplier to produce poultry premixes on the same production line as cat and dog premixes to eliminate the risk of antibiotic contamination.

## Switch to vaccination

In June 2002, looking to fill the void left by in-feed anticoccidials, Joosen-Luyckx began vaccinating its standard broilers for coccidiosis with Paracox-5, a live vaccine administered to day-old birds in the hatchery. They had used

## Now *that’s* a good IDEA

Joosen-Luyckx’s approach to intestinal health mirrors many of the recommendations presented at “New Paradigms in Poultry Nutrition and Management,” a symposium hosted by Schering-Plough Animal Health in Portugal last spring.

The event, attended by more than 30 leading poultry specialists worldwide, including Joosen-Luyckx’s Marc Claeskens and Willy Verdonck, gave birth to the IDEA concept, a new approach to managing broiler feeds.

IDEA stands for Impulse, Digestibility, Economy and Advance — all key concepts for promoting better intestinal health in young chicks.

As a general rule, IDEA requires making a higher investment in quality, digestible feeds in the first 25 to 28 days and then a lower investment in the final phase when birds are consuming the most feed.

Researchers speaking at the symposium said focusing on immunity development, digestibility of the feed and intestinal integrity is more important than actual nutrient levels.

For more information about IDEA, see [www.IntestinalHealthPoultry.com](http://www.IntestinalHealthPoultry.com) or *CocciForum* No. 10, available online at [www.thepoultrysite.com/cocciforum](http://www.thepoultrysite.com/cocciforum).

the product successfully in Le Coucou birds and their organic line, but Verdonck admits to being nervous at first about pulling ionophores from the feed of standard broilers.

“To be honest, I was very afraid of the standard broilers becoming infected with coccidiosis after we stopped using feed medications, because that’s the

the birds got older, and we suspected the drugs were losing their effectiveness,” he explains. “That’s completely gone now. With the vaccine, we don’t have to worry about coccidiosis.”

Using a vaccine has also given the company more marketing flexibility. Like many producers in Europe, Joosen-Luyckx markets broilers in stages. While some birds are raised to 2.3 to 2.5 kg (5.07 to 5.51 lbs), others are sold at 1.8 kg (3.97 lbs) to meet local demand for smaller birds. Other times, Claeskens says, retailers suddenly order more birds to meet the needs of a special promotion. That means Joosen-Luyckx has to sell more lightweight birds than expected — an option they wouldn’t have if they had to worry about a drug’s withdrawal time.

“There’s a 10-day withdrawal period on some anti-coccidial drugs,” Claeskens says. “It takes us about 33 to 36 days to get a bird to 1.8 kg. If you have a 10-day withdrawal period, you have to pull the drug at 23 days. And if you do that, you will almost certainly get coccidiosis at 28 days and then you’ll have nothing but dead chickens. With the vaccine, we don’t have to worry about withdrawal times, and

we know it will protect against coccidiosis for the full life of the bird. The best part is we can market the birds any time.”

### Treating enteritis

For Joosen-Luyckx, the biggest challenge of not using antibiotic growth promoters is the potential for a greater incidence of necrotic enteritis. In drug-free production, it also appears more in the acute form rather than the chronic form.

way we had always managed the disease in our more intensively raised birds,” Verdonck says. “But the vaccine has worked very well for us. Coccidiosis has not been a problem, and the birds’ performance is as good or better than it was when we used medications.”

Claeskens says vaccinating with Paracox-5 has also eliminated the need to rotate in-feed anticoccidials. “We were seeing coccidiosis outbreaks as



*Verdonck (right) inspects drug-free feed with associate Marc Claeskens (left) and Matty Vertommen of Schering-Plough. ‘The vaccine has worked very well for us. Coccidiosis has not been a problem.’*

Claeskens says the key to managing acute enteritis is to react quickly.

“The farmer has to be alert to the fact that suddenly 10 dead birds in a house of 20,000 broilers is very important,” he says. “If he waits 2 days, he might have 200, 400, 500 dead birds. You need to get in there and treat right away with an antibiotic in the water, usually amoxicillin, lincomycin or tylosin.”

Claeskens says acute enteritis was initially a problem in about 80% of their houses following the removal of antibiotic growth promoters from the feed. Through more vigilant biosecurity and changes to their nutrition program, he and Verdonck have been able to cut that incidence dramatically.

“I did a study comparing our number of antibiotic treatments with other integrators that were using antibiotics and ionophores in the feed,” he adds. “The need for antibiotic treatments was very similar, only 6% more, so I think the change to drug-free production has been worthwhile.”

### **More emphasis on nutrition**

Claeskens and Verdonck believe that most enteric problems can be managed effectively through nutrition and using high-quality raw materials, particularly in the starter ration, to stimulate good intestinal health early in the bird’s development. This strategy can also help to minimize or eliminate any short-term performance setbacks caused by the coccidiosis vaccine, which introduces a controlled, balanced dose of *Eimeria* organisms to stimulate the bird’s natural immune system so it can fight coccidiosis without drugs.

Verdonck says it’s also important to be consistent with feed ingredients in drug-free birds. Making abrupt changes in the diet can stress birds and compromise intestinal health.

“For many years a nutritionist’s job was to optimize feed performance for the least cost,” he explains. “So when a certain raw material became cheaper, we would use it in the broiler diet at high levels. The market would determine what ingredients we used, and we could change them quickly as the prices went up and down.

“I think that’s more difficult to do that today because the antibiotic growth promoters had kind of a regulating effect,” he continues. “If we went from using a fast digestible starch to a slow one, for example, it was easier because the antibiotic provided a cushion and helped to offset the stress caused by changing the diet.”

### **Don’t push**

Claeskens says producers need to change the way they approach their nutrition program and cautions against pushing the birds too hard.

“Today you have to play more with digestibility. Don’t just think about grams of growth per day,” he adds. “If you need a daily growth of 80 grams, simply raising the amount of energy in the diet isn’t going to work in drug-free birds as it works in medicated birds.

“What you lose in growth from not using an antibiotic, you can make up for with high-quality ingredients, better digestibility and improved intestinal health in the first 25 days of age.”

## 'LOVE AT FIRST SIGHT'

Holland's Dr. Wil Landman and Herman Peek talk about their great interest in *Eimeria*, concerns about resistance and next steps for improving control

*Editor's note: Much has been written and presented in recent months about live coccidiosis vaccines and their ability to restore the sensitivity of Eimeria organisms — the ones that cause coccidiosis in poultry — to ionophore antibiotics, chemicals and other in-feed anticoccidials that have lost some effectiveness from overuse in the field.*

*The last issue of CocciForum (No. 10), for example, carried a report about a study conducted in the Netherlands by Dr. Wil J.M. Landman and Herman W. Peek of the Animal Health Service, Ltd. in the Netherlands describing an association between the use of Paracox-5 and higher sensitivity toward anticoccidial drugs of Eimeria spp. field isolates. Shortly afterward, Landman and Peek authored an article on the same topic for World Poultry (No. 7, Vol. 21) and presented their research at the IX International Coccidiosis Conference in Brazil.*

*The managing editor of CocciForum recently visited Landman and Peek at their lab in Deventer to learn more about their focus on coccidiosis and the challenges facing the industry.*

**CF: THESE DAYS IT'S HARD TO TALK ABOUT EIMERIA RESISTANCE TO IONOPHORES AND CHEMICALS WITHOUT YOUR NAMES COMING UP IN CONVERSATION. WITH ALL THE POULTRY HEALTH PROBLEMS YOU COULD STUDY, WHY THE FOCUS ON COCCIDIOSIS? WAS THERE SOMETHING IN PARTICULAR THAT FASCINATED YOU ABOUT THE DISEASE?**

**PEEK:** For me it started in 1984. At first I worked at the University of Utrecht with toxoplasmosis, and the diagnostic techniques used for that disease are almost the same for coccidiosis. Later on I also worked with Dr. Matty Vertommen (now with Schering-Plough Animal Health in Benelux) — a great inspiration. So together we built up a lot of personal interest in coccidiosis. We knew it was a costly disease for the poultry industry and, as scientists, we like to solve problems. That's what got me started.

**LANDMAN:** I guess I got the calling when I was a little younger. I was 8

years old when I knew I wanted to be a vet. And I loved birds. So it got to be a combination between something with feathers and animal disease. I ended up in a poultry house. And within the poultry industry, I've touched a number of disease areas. At the Animal Health Service, we don't have the opportunity to devote our entire lives to working with one disease in one species. But in our case, since we are close to the field, we need to cover a large part of poultry healthy and give priority to what the field demands — and one of those areas is coccidiosis. I've been working with coccidiosis with Hermann for the past 3 years.

**CF: OVER THE LAST COUPLE OF YEARS, WHAT SORT OF TRENDS DO YOU SEE DEVELOPING IN THE INDUSTRY WITH RESPECT TO EIMERIA STRAINS AND MANAGING COCCIDIOSIS?**

**LANDMAN:** My concern is that producers are getting used to the problem. They don't see coccidiosis for

what it really is — a costly disease that can have a big impact on their operation, often without them knowing it. In every flock there is coccidiosis. How much it affects an operation depends on whether the farmer recognizes that it's a problem and how he goes about managing it.

**PEEK:** Unfortunately, many producers don't recognize *Eimeria* resistance when they see it. They think they're controlling it with a drug or chemical, and they probably are to some extent. But they don't know how well that drug is actually working. Often they are losing performance and they're not aware of it. They're getting used to the disease being in their flocks. They're not aware that there are ways to make the drugs work better. They don't know there's resistance building, but they're seeing losses in performance.

**CF: SO HOW DO YOU, AS SCIENTISTS IN A LABORATORY, GET INVOLVED WITH CHANGING THEIR PERSPECTIVE ON COCCIDIOSIS CONTROL? WHAT I'M HEARING IS THAT PRODUCERS AREN'T EVEN AWARE THAT THEY HAVE A COCCIDIOSIS PROBLEM, AND IT'S VERY RARE YOU SEE AN ACUTE OUTBREAK OF IT.**

**LANDMAN:** That's true to some extent. Overall, our impression is that problems in the field do not correlate directly with the degree of resistance that we find in the lab, so that tells us we still have a lot to learn about this organism. We think it might be related to the fact that sometimes there is still some residual effect of anticoccidial drugs, even though they will show resistance in the lab. That residual effect might slow the infection a little bit and perhaps induce a natural response against the parasite. That might be one of the reasons why people in the field are not seeing the major outbreaks, but still the drugs are underperforming.



*Peek and Landman: 'We inspire each other'*

**PEEK:** We saw the difference in coccidiosis control when diclazuril (Clinacox) was introduced in Europe several years ago. Producers experienced better performance because it was a new anticoccidial. They had become used to having a high incidence of subclinical coccidiosis in their flocks, but they didn't realize it until they got such a tremendous boost in performance from the new chemical. Unfortunately, diclazuril was overused by some operations and *Eimeria* eventually built resistance to that product, too.



Peek: 'One of the things we'd like to do is to show the mechanism behind the restoration of resistance.'

**LANDMAN:** Over the last few years, we have seen a steady increase of cases involving *Eimeria* resistance — and the incidence is quite high.

**CF:** SO WHAT KIND OF REACTION DO YOU GET FROM VETERINARIANS AND PRODUCERS IN THE FIELD

WHEN YOU COME BACK AND SAY *EIMERIA* SPECIES ARE DEVELOPING RESISTANCE TO THE DRUGS THEY'RE USING?

**LANDMAN:** It's difficult because, as we said earlier, they're not even aware that have a problem. They're not seeing the performance losses, even though we know they are there. Some of the anticoccidial drugs have a growth promotion effect, but the drugs are not intended for that purpose.

If you look at the drugs strictly for what they're meant to be — anticoccidials — then you could say they're not performing as they should.

**CF:** NOW THAT ANTIBIOTIC GROWTH PROMOTERS ARE BANNED IN EUROPE, DO YOU THINK THERE WILL BE MORE OF A TENDENCY TO USE IN-FEED ANTICOCIDIALS TO GET SOME OF THAT GROWTH PROMOTION EFFECT?

**PEEK:** They might, but the ionophores and chemicals are supposed to be used for coccidiosis control only. They're not approved as growth promoters and shouldn't be used for that purpose.

**LANDMAN:** And if they do use them for growth promotion, that certainly won't help to improve the growing

resistance problem with *Eimeria*, that's for sure.

**CF:** IN YOUR RESEARCH, WHERE YOU STUDIED THE SENSITIVITY TO DICLAZURIL AND MONENSIN OF EUROPEAN *EIMERIA* SPECIES FIELD ISOLATES AND FOUND AN ASSOCIATION BETWEEN HIGHER SENSITIVITY TO THOSE ANTICOCIDIALS WHEN ISOLATES ORIGINATED FROM FARMS FOLLOWING A VACCINATION POLICY, WERE YOU SURPRISED BY THE RESULTS?

**PEEK:** Not really. It was a very interesting and nice finding. Although direct proof of restoration was not obtained in this study (for that matter another design is required), it strongly suggested it. Restoration has been shown by others previously — Dr. [S.J.] Ball in the 1960s being the first — then others have shown this using virulent coccidial vaccines. But I believe our work is the first suggesting this response after using an attenuated vaccine. So in that sense, it was a bit unexpected, but not if you look at the whole context of restoration of sensitivity.

**CF:** WHY WOULD THAT BE UNEXPECTED WITH AN ATTENUATED VACCINE?

**PEEK:** Possibly because non-attenuated vaccines will replicate sensitive oocysts more aggressively, but our work suggests that it may also occur with an attenuated vaccine. Not in all cases, but in half of the cases. In the other half there was always a non-significant trend toward more sensitivity.

**CF:** SO HOW FAR CAN YOU TAKE THIS WORK? YOU'VE MADE GREAT STRIDES IN DOCUMENTING RESISTANCE AND YOU'VE SHOWN HOW SENSITIVITY CAN SHIFT AS PEOPLE



## CHANGE THEIR PROGRAMS, BUT WHAT'S THE NEXT STEP IN YOUR RESEARCH WITH COCCIDIOSIS?

**LANDMAN:** We have more plans, but we lack funding.

## CF: WHAT WOULD YOU LIKE TO DO? WHAT WOULD THE NEXT STEP BE?

**PEEK:** One of the things we'd like to do is to show the mechanism behind the restoration of resistance. Some say, well, it's just displacement of the resistant strain, which I personally don't believe because our sensitivity tests show that, when you find an increase in sensitivity, it's not a black-white thing.

Is it a full replacement of the resistant strain? What is the sensitivity of the vaccine strain? We have found intermediate patterns of sensitivity.

Some scientists ask if there is some genetic interbreeding between a resistant and a sensitive *Eimeria* strain — and that seems a more logical thing to happen. Then you could also have combinations of both strains, and that's probably the case. It would be nice for someone to dig into it and find out.

## CF: YOU BOTH WENT TO BRAZIL LAST SEPTEMBER FOR THE IX INTERNATIONAL COCCIDIOSIS CONFERENCE, WHERE YOU MET WITH ALL THE TOP COCCIDIOSIS EXPERTS IN THE WORLD. YOU PRESENTED YOUR SENSITIVITY RESEARCH TO A VERY WELL-EDUCATED, ANALYTICAL AUDIENCE. WHAT WAS THE TOUGHEST QUESTION THAT YOU RECEIVED?

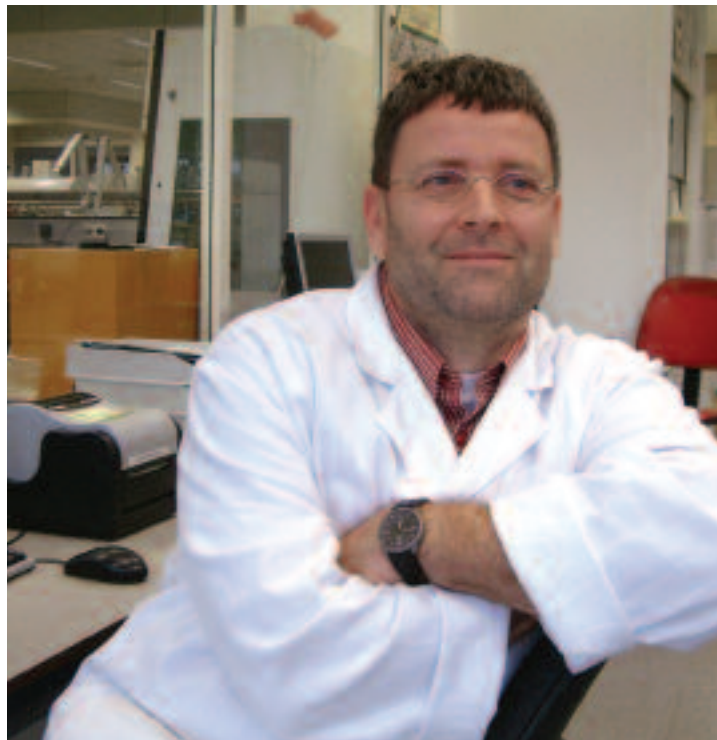
**LANDMAN:** We didn't get one. I think the audience understood our story very well. The main question is, what is the mechanism behind restoration of sensitivity? That's the thing that

people are trying to understand and document. Because that might teach us more about coccidiosis and how to prevent it.

## CF: IS THERE SOMEBODY IN THE FIELD OF COCCIDIOSIS RESEARCH THAT THE TWO OF YOU REALLY LOOK UP TO?

**PEEK:** I like Dr. Ray Williams in the UK. Because when I read his articles, I feel like I'm talking to him. He's having the same thoughts about it.

**LANDMAN:** Yes, I think I'm along the same line, but there are other very inspiring names also.



*Landman: '...we have seen a steady increase of cases involving Eimeria resistance — and the incidence is quite high.'*

## CF: JUST BECAUSE OF THE WAY HE WRITES?

**PEEK:** And the way he does his research, of course. And the solutions he proposes. The way he's thinking about the problems that he sees. I like his approach.

*continued on page 26*

## Seeing Red

Virtually everyone in the poultry industry knows that young chicks are attracted to red. It's one of the reasons that Schering-Plough Animal Health recommends adding red dye to the coccidiosis vaccine solution. The red encourages preening among vaccinated chicks and facilitates the ingestion and spread of live oocysts that stimulate natural immunity.

Now, Dr. Rae Fischer of Fisher Feeds is taking that idea a step further.

To maximize feed intake during the first 4 to 5 days of development and optimize bursa and gut development, Fischer is now using a patent-pending process to add red to the feed. The result is a feed product called REDvantage, which looks like crumbles of red licorice that are quickly finding their way into the intestinal tracts of young chicks.

"In trials with 350,000 chicks, we've seen an increase in body weight of 4.81 grams (0.17 oz or 0.01 lb) in cockerels and 4.20 grams (0.15 oz or 0.01 lb) in pullets during the first 7 days, which should translate to increased performance as well as increased bird health due to better gut and immune system development," he explains.

"Rapid growth of a healthy bird is the ultimate goal," Fischer adds. "Unless the gastrointestinal system can quickly mature and provide the necessary substrates, demand organs such as muscle never catch up, leaving money on the table."

Research and development manager Derek Detzler notes that market weight is generally 7 times the birds' weight at 7 days old, so a loss of only 5 grams (0.18 oz or 0.01 lb) during the first week of life ultimately adds up to 35 grams (1.23 oz or 0.08 lb) of weight loss. "In other words, every gram you put on that first week has the potential to be an extra 7 grams at market weight," he says. "We want to give ourselves every opportunity to get that."

Detzler notes that their "impulse" strategy is consistent with the IDEA concept — Impulse, Digestibility, Economical and Advantage — a nutritional strategy that promotes good intestinal health early in the chick's life as a means of reducing enteric infections and optimizing the performance of birds vaccinated for coccidiosis. (See [www.IntestinalHealthPoultry.com](http://www.IntestinalHealthPoultry.com).)



*Chicks raised on red feed have shown increased bodyweight during the first 7 days.*

The red-colored starter feed, adds Fischer, will help attain the best weight and be an excellent complement to the coccidiosis vaccination program. "Any time you use a vaccine, you're relying on the bird's immune system to be competent and respond well to the vaccine," he says. "When you have a healthy gut, you win on all fronts because it can stand up to enteric challenges while allowing the vaccine to perform more effectively. Science tells us that if we can increase feed intake, gut development and bursa development in the young bird, we're going to get a better response to the vaccine, as well as a better response to necrotic enteritis or other disease challenges that might be in the gut."

"If you lose that first week," concludes Fischer, "you're not going to get it back. When you get good feed intake, you're starting with a full tank and have more potential to maximize the genetics of the flock."

a feed mill, but I just hate putting chemicals and antibiotics in the feed," he says. "I want the emphasis to be on good nutrition programs, with quality raw materials, ingredients and process-

ing. When you add drugs to the mix, you have to flush the lines after every batch, keep track of shuttle programs, worry about medicating the wrong feed and so on. Salinomycin, for example,

can kill turkeys. If we could take every medication out of this mill, it would be a dream come true — even though I still think they can do a lot of good in the right situations and may be required for therapeutic use.”

### Sensible option

Fischer was also concerned that excessive use of medications was becoming a substitute for good management and was making producers complacent. “Our problem is that production has become very comfortable,” Fischer says. “Producers need motivation for change, and the trend toward raising drug-free birds provides one. Vaccination just seemed like a sensible thing for us to try.”

Fisher Feeds’ contract hatchery, which supplies chicks to Fischer’s own farm and to Fisher Feeds’ customers, started immunizing day-old chicks with Coccivac-B live coccidiosis vaccine in the spring of 2004. This practice continued for 24 weeks before rotating back to a chemical and eventually to ionophore antibiotics in the feed.

“We thought spring was a good time to start with vaccination because there was more air movement through the barns and less of an *Eimeria* organism buildup in the drier litter, which in Canada is changed with each flock,” he explains. “But based on our experience so far, I don’t see why we couldn’t vaccinate year-round.”

Fischer says he had expected to see a drop in performance in the first vaccinated flock, particularly in smaller birds. This is because birds raised to 38 to 42 days have less time to bounce back from an initial setback that might occur as vaccination stimulates the bird’s immune system.

### Good intestinal health

“We never saw the dramatic drop in performance that we were looking for,” Fischer reports, “probably because our nutrition program helped to condition the gut and help it tolerate the chal-

## Ten Reasons to ‘Impulse’ Chicks

Dr. Rae Fischer presents these arguments for getting chicks off to a fast start with a good intestinal health program:

1. Under optimum conditions, chicks can grow to 5 times their initial body weight in their first 7 days of life.
2. Broilers achieve maximum relative weight of the gastrointestinal organs between 3 and 8 days of age (Dror, Nir, Nitsan, 1977).
3. The highest increase in the volume of villi in the duodenum occurs at 4 days of age (Noy and Skylan, 1997).
4. Faster utilization of yolk in early fed birds could possibly be due to increased intestinal mechanical activity (Noy et al, 1996).
5. Weight in 6- and 7-week-old broilers has a direct linear relationship to the first week of rearing. This is not due to breeder age or day-old chick weight (Pezeshkian, 2002).
6. 1 extra gram of weight at 7 days means an extra 5 to 7 grams at market. (Aviagen and Cobb Vantress).
7. Broilers that fast for 24 to 48 hours have lower bursa weights and a lower bursa/body-weight ratio (Dibner et al, <http://www.novusint.com/Public/Products/OasisNeonatalFeeding.asp>).
8. Lower bursa weight leads to lower proliferation of lymphocytes (Dibner et al, 1998).
9. Delays in water and feed consumption depress immune response (Casteel et al, 1994).
10. Functional maturity of the gut is linked to maturation of the local immune system (Bar-Shira. *Israel Journal of Veterinary Medicine*. 2005; 60:No. 2.)

lenge from the vaccine.”

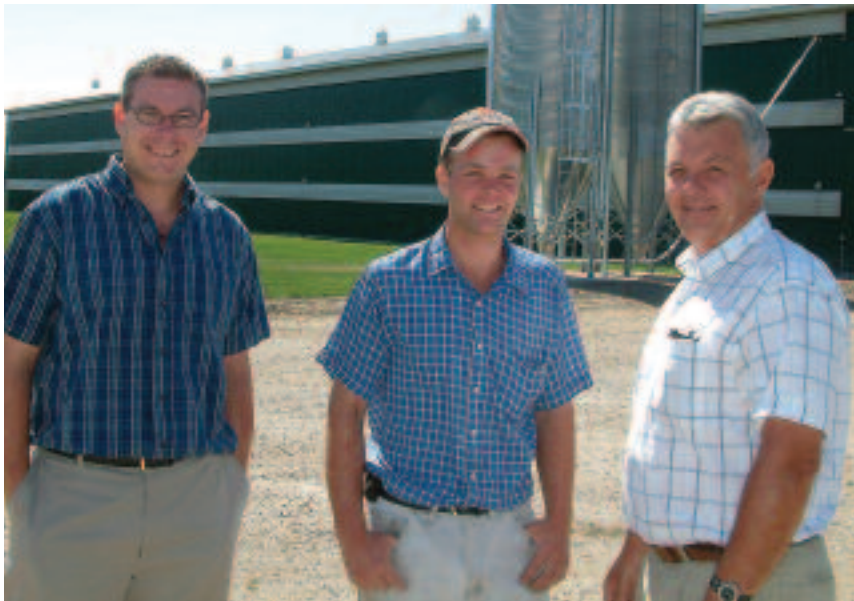
After returning to chemicals and ionophores, Fischer also did not see a big jump in production. In some cases, he adds, performance actually went down after vaccination stopped.

“In the end, I think a lot of this comes back to the quality of the feed program,” he says. “Whether you’re vaccinating or medicating for coccidiosis, it’s important to promote good intestinal health through nutrition.”

Since 1997, Fisher Feeds has used a feed expander before pelleting to opti-

mize nutrient availability and eliminate or significantly reduce pathogens.

“We get far more absorption high in the gut than we do with normal, unexpanded feed,” Fischer says. “There’s less residue in the lower gut. I think our gut health has improved with the expanded feed, and we have fewer challenges in the lower gut because there’s less substrate. The expanding process does an excellent job of reducing the bacterial load in the feed, which is really important.”



*Fisher Feeds’ R&D manager Derek Detzler, farm manager Eric Martin and Dr. Rae Fischer outside two-story broiler building.*

### **Nothing to fear**

Vaccinating for coccidiosis wasn’t a new practice for Fischer. He had 8 years’ experience with it in turkeys, which obviously are grown to heavier weights and can take full advantage of the vaccine’s lifelong protection.

“Vaccinating broiler chicks does require good management and you need to make sure things are done properly, but the SprayCox spray cabinet technology is good and definitely not something to be afraid of,” Fischer insists. “The more you work with it, the more you understand it. There just has to be a motivation to change. For me, it’s controlling a very prevalent disease without drugs in the feed. I really like that idea.”

Derek Detzler, manager of research and development for Fisher Feeds, says that coccidiosis vaccination has been well received on the grow-out farms so far. “If the vaccinated birds weren’t sprayed red, I don’t think most producers would have known the difference,” he says, referring to the red dye in the vaccine that promotes the preening and distribution of the *Eimeria* oocysts that stimulate immunity.

“Production is as good or better than what we had before,” concurs Eric Martin, who manages 60,000 square feet of finishing space at one of Fisher Feeds’ farms. “Vaccinated birds tend to flush a little more around day 17 and you may see some wetter litter.”

### **High-rise barns**

Most of Fisher Feeds’ birds are grown out in two- and three-story barns stretching 40 to 46 feet (wide) with up to 30,000 square feet of space.

Fischer Feeds’ operation broods chicks on one whole side of the house for the first 5 days to help regulate the young birds’ exposure to the *Eimeria* organisms in the vaccine, which are passed and re-ingested to promote natural immunity. “You don’t want the chicks to get too far away from the area that’s been seeded by the live vaccine,” he says.

Detzler says this practice also keeps the chicks close to the feeder to ensure good intake. “We don’t want the chicks to have to look for feed,” he explains. “That 24 to 48 hours of fasting that can occur in some flocks is a tremendous detriment to gut development and the immune system, so we make every effort to get them off to a fast start and build a healthy intestinal tract.”

Looking ahead, Fischer thinks they will eventually vaccinate for coccidiosis all year round. “I don’t see any scientific reason why we couldn’t vaccinate all the way through — and that’s something we’ll be looking at for the near future,” he says.





All issues of CocciForum magazine are now available online for quick reference.

A new web site for *CocciForum* magazine will help the poultry industry keep abreast of the latest strategies in coccidiosis management. The site can be accessed at [www.thepoultrysite.com/cocciforum](http://www.thepoultrysite.com/cocciforum).

“The *CocciForum* web site is an invaluable resource for producers, veterinarians, nutritionists, students — just about anyone who wants to learn more about this costly disease in poultry and, more important, new strategies for control,” says Dr. Charlie Broussard, director of global poultry technical services.

The site offers quick-read HTML versions of all articles from past issues. Visitors can also download PDF files of entire issues.

Sponsored by Schering-Plough Animal Health and developed in cooperation with The PoultrySite.com, *CocciForum Online* also serves as a portal to the publishing group’s weekly newsletters, as well as valuable information on other poultry diseases. In addition, the site features a search engine for researching specific poultry topics.

### Schering-Plough Animal Health Marks 50th Anniversary with \$50K Donation

Schering-Plough Animal Health Corporation celebrated its 50th anniversary recently and, to commemorate the milestone, donated \$50,000 to the American Veterinary Medical Foundation (AVMF) to support its Veterinary Medical Assistance Team (VMAT) program.

Established in 1963, AVMF is the largest national veterinarian-directed charity dedicated to disaster preparedness and response. VMAT provides treatment and aid to animals used in search-and-rescue efforts and animals hurt or endangered by catastrophic events such as floods, hurricanes, fires and earthquakes.

“We are very pleased to receive this generous donation from Schering-Plough Animal Health to help us provide the

veterinary medical care needed in times of emergency,” said R. Tracy Rhodes, DVM, chairman, AVMF board of directors.

Raul Kohan, president of Schering-Plough Animal Health and group head, Global Specialty Operations, said, “Schering-Plough Animal Health’s first 50 years have seen challenges as well as exciting innovations. It is most appropriate that we are sharing this celebration with the American Veterinary Medical Foundation because it is our commitment as a company that is research-based to provide innovative and high-quality products that support our veterinary medical partners in our shared goal of improving animals’ lives.”

### Katrina Victims Helped By Schering-Plough

Donations from Schering-Plough Animal Health for animals affected by Hurricane Katrina reached nearly \$500,000 by the end of 2005.

The Category 3 storm had devastating effects on poultry companies located in or near the Gulf region. Close to 200 chicken houses were totally lost, about 800 were damaged and an estimated 6 million chickens were killed, according to one source. About another 70 million birds suffered feed outages because feed mills were without power. Processing plants were down for a week before safe



Resilient chicks emerge from the rubble left by Katrina. Photo courtesy of Al Bergin.

water and power could be restored.

Schering-Plough Animal Health donations are helping all types of animals and have included pharmaceuticals, vaccines, surgical tools and materials, and the company’s Poultry Business Unit has offered to credit poultry customers with any Schering-Plough Animal Health vaccines that were lost.

Schering-Plough Corporation, parent company to Schering-Plough Animal Health, also donated \$500,000 as well as medicine and products and organized an employee matching program to support the Katrina relief effort.

**CF:** HAVE YOU SEEN ANY PARALLELS BETWEEN THE WORK YOU HAVE DONE WITH COCCIDIOSIS AND ANY OTHER POULTRY DISEASES? OR DO YOU THINK THAT YOUR RESEARCH MIGHT IMPACT ANY OTHER AREAS OF POULTRY DISEASE MANAGEMENT?

**LANDMAN:** That's an excellent question. Yes, there are parallels but I don't think scientists are that original, let me say that first. We tend to copy and learn from each other. A finding in a given species/circumstance by an author may prompt another to see if that same discovery applies to another species/circumstance. We are playing variations on a similar theme. The creativity lies in composing slightly different melodies that will help us understand what lies beneath using each other's information.

**PEEK:** Well, I like to say that we *inspire* each other. And generally, we learn from each other, and we learn also from other animal species or other work that has been done. It goes back and forth. From the resistance work, yes, I think it's similar for other diseases. In bacteriology, for instance, when you have resistance problems you try to find another antibiotic or another program. If you don't have antibiotics or if residues are a problem, you might try a vaccine. That's the trend in poultry for coccidiosis.

**CF:** WE'VE TALKED ABOUT GOING TO INDUSTRY CONFERENCES WHERE PEOPLE ALREADY KNOW YOU, BUT WHAT HAPPENS WHEN YOU'RE AT A COCKTAIL PARTY AND SOMEONE COMES UP AND SAYS, "WHAT DO YOU DO?" HOW DO YOU ANSWER THAT QUESTION?

**LANDMAN:** I always say that I'm a chicken doctor. And they respond,



*Peek and Landman at work in their lab in Deventer.*

"You're a *what!*" Sometimes people don't even know there are billions of chickens in the world. They don't think about where their food comes from. That's one of the problems of our time, I think. Due to all the luxuries that we have, we have become so distant from nature that we think that meat and eggs come from a little hole in the wall. Like you can just open a drawer and there you have an egg. And people don't realize that for producing eggs and meat, affordable buys for such a large human population, you need to build large-scale operations. But when you start explaining about it and they understand what the impact is, and the importance of hav-

ing good health care for the poultry industry, it makes sense to them.

**CF: WHAT'S YOUR TYPICAL DAY LIKE HERE AT THE LABORATORY, IF THERE IS SUCH A THING?**

**PEEK:** Every day is different. One day you may have animal experiments to do, another laboratory testing, then statistical analyses, etc.

**CF: DOES IT EVER GET MONOTONOUS? DO YOU EVER COME TO WORK SOME DAY AND SAY, "I'M GETTING TIRED OF COCCIDIOSIS. I WANT TO WORK WITH NECROTIC ENTERITIS OR MYCOPLASMA"?**

**PEEK:** I guess I'm just frightened, because I don't have those thoughts.

**CF: BECAUSE YOU'RE ENJOYING WHAT YOU DO.**

**PEEK:** Yes, I think so. I'm never bored here.

**LANDMAN:** When you explain to people that you do research, they tend to think it's boring with all this data, all this attention to detail. But it's not boring at all, because it's all different. We always have different projects, different questions to be answered. It's a whole project — from animal experiments, to writing papers, to visiting congresses, to visiting farms. There's quite a lot of travel involved. It's really varied, so I would say it's a great job.

I get to see the world because of chickens.

**PEEK:** For me the whole chicken pathology was love at first sight. And I will enjoy it every time I see pathology happening. It's fascinating. I can just gaze at these lesions and marvel at how it all happens. So it never gets boring. I think this work comes from the heart. It's the only way to keep on.

**CF: SOMETIMES WHEN PEOPLE CAN'T SLEEP, THEY COUNT SHEEP. DO YOU COUNT OOCYSTS?**


[laughter]

**PEEK:** No, because I don't think they would put me to sleep. I have an emotional connection with coccidiosis, but it does not prevent me from sleeping.

**LANDMAN:** I can sit for hours at a microscope and look at nothing but *Eimeria* oocysts. The sporulation process, for instance, is absolutely fascinating, especially with *Eimeria maxima* because the oocysts are big.

**CF: IT SOUNDS LIKE YOU REALLY LOVE YOUR JOB.**

**LANDMAN:** Yes, very much. It's extremely rewarding.

**PEEK:** And there's still so much we don't know about coccidiosis. We have a lot to keep us busy. 

## COCCI FORUM

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