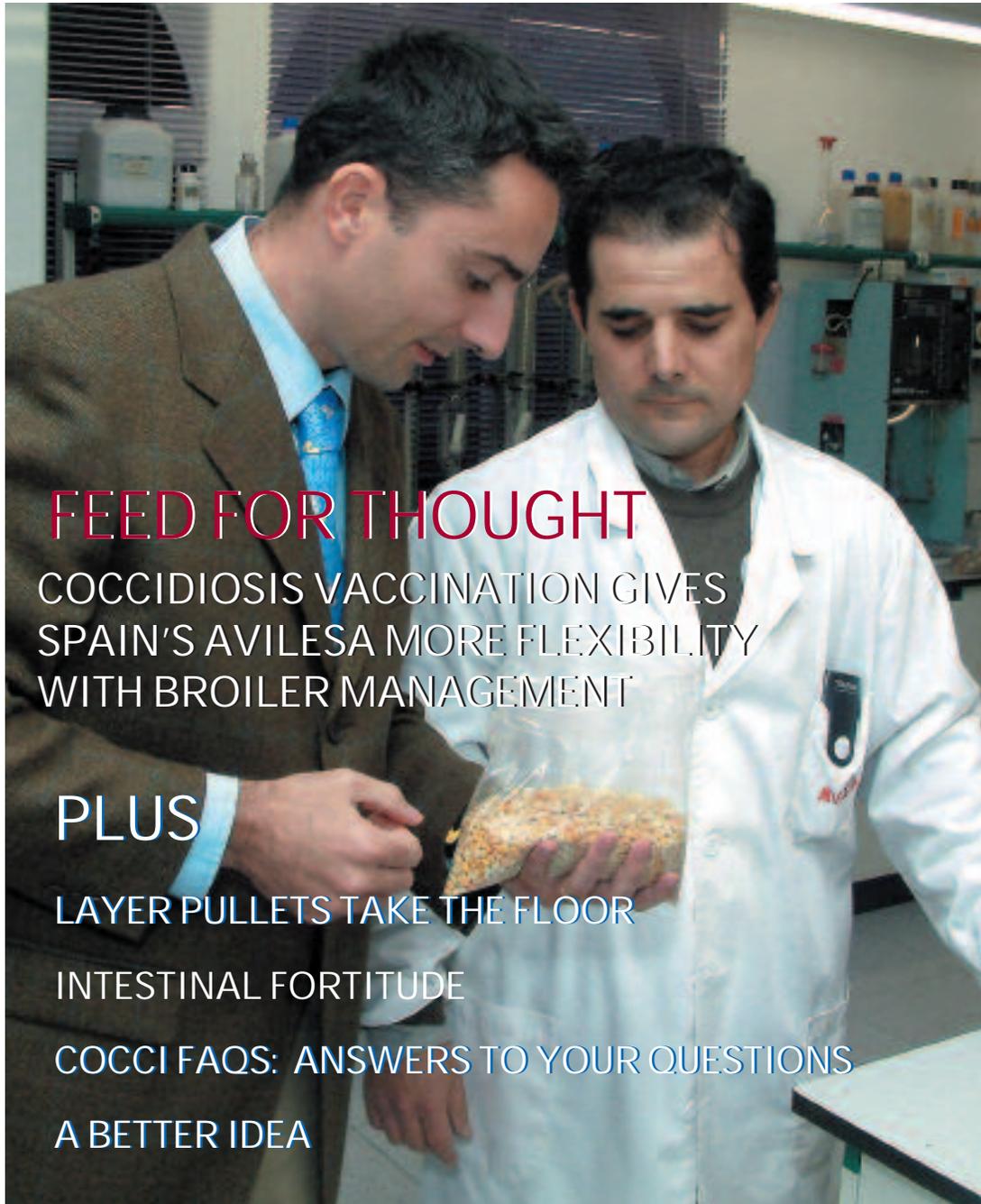


COCCI FORUM

NEW STRATEGIES FOR COCCIDIOSIS MANAGEMENT



FEED FOR THOUGHT

COCCIDIOSIS VACCINATION GIVES
SPAIN'S AVILESA MORE FLEXIBILITY
WITH BROILER MANAGEMENT

PLUS

LAYER PULLETS TAKE THE FLOOR

INTESTINAL FORTITUDE

COCCI FAQS: ANSWERS TO YOUR QUESTIONS

A BETTER IDEA

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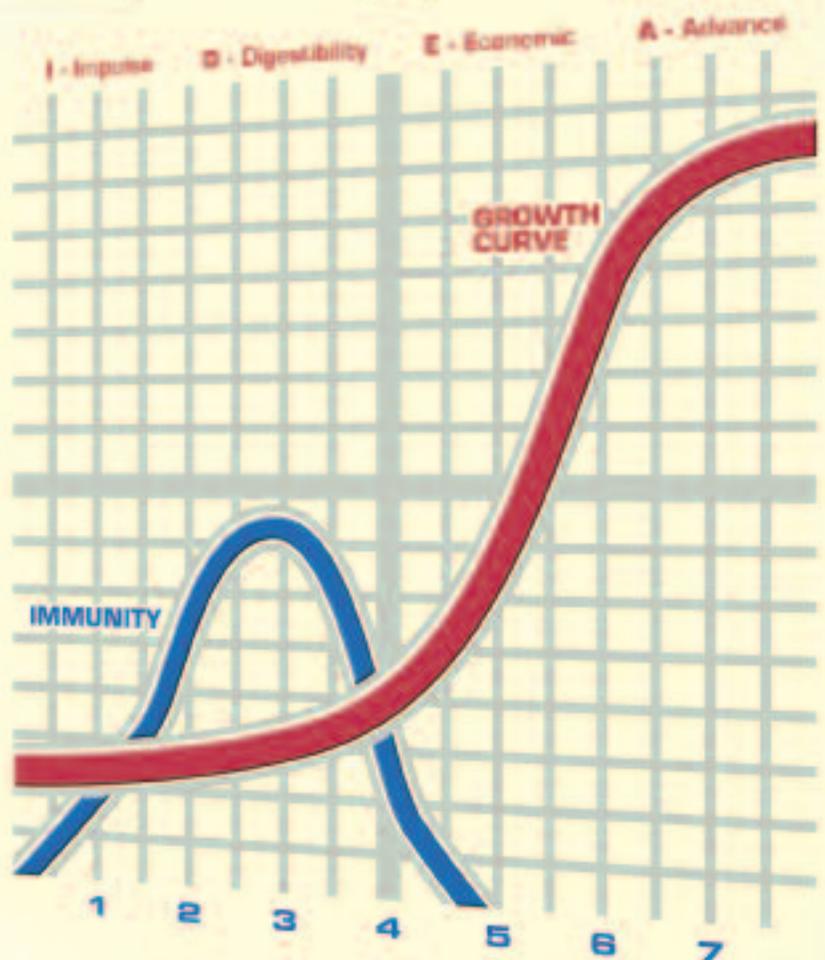
 Schering-Plough Animal Health

NUMBER 9

As the effectiveness of in-feed drugs has eroded due to resistance, the industry needs a NEW approach for birds that depend on immunity for intestinal health and performance.

IDEA[®]

The **IDEA** Program—
A novel nutritional
and management
concept for birds
vaccinated with
Paracox[®]-5 or
Coccivac[®]-B.



Schering-Plough Animal Health
EXPERTISE... COMMITMENT... VALUE

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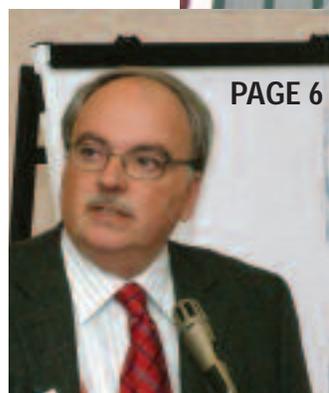
NUMBER 9

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Blending nutrition into coccidiosis management



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Cover: Dr. Juan Pablo Perez (left) of AVILESA checks feed before it's shipped to one of the company's broiler farms. When vaccinating for coccidiosis, AVILESA can be more flexible and efficient with its nutritional program because it does not have to worry about withdrawal times of in-feed anti-coccidials. Our cover story begins on page 2.

Photo by Joseph Feeks.

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FEED FOR THOUGHT

Coccidiosis vaccination gives Spain's AVILESA more flexibility with broiler management

AVILESA had several good reasons to make vaccination part of its coccidiosis management program in standard broilers. The Spanish poultry producer's most immediate goal, however, was to stop the continuous use of in-feed anticoccidials and reverse what management felt was a growing resistance problem.



Dr. Juan Pablo Perez. 'I was concerned that more pathogenic strains of Eimeria were developing.'

"Some anticoccidials simply were not working as well as they used to," says Dr. Juan Pablo Perez, a veterinarian in charge of nutrition and anticoccidial programs at AVILESA, or Avicola Levantina, S.A., based in Murcia, Spain, about 230 kilometers (143 miles) south of Valencia near the southeastern coast.

"Even though we used them in carefully planned shuttle programs, I was concerned that more pathogenic strains of *Eimeria* were developing and that the disease would become more diffi-

cult and costly to control. I know that in flocks with subclinical coccidiosis, average daily gain and feed conversion can be just awful. We needed to make some changes before any major setbacks occurred."

After conducting a few trials, AVILESA decided to vaccinate standard broilers with Paracox-5 for at least two cycles to give traditional anticoccidials a much-needed rest. He then planned to go back to using in-feed anticoccidials.

Today, some 3 years later, coccidiosis vaccination has become an essential part of the coccidiosis management program at AVILESA, which processes some 12 million birds a year. The vaccine is administered in the hatchery to day-old birds. A specially designed SprayCox spray cabinet ensures uniform distribution and development of attenuated oocysts, which stimulate natural immunity in the birds and provide lifetime protection.

Kicking the drug habit

For AVILESA, vaccinating for coccidiosis is also helping the company reduce drug usage without compromising the health or the performance of the birds.

"Consumers today take a lot of interest in how their food is raised," says Dr. Juan Martinez, a field veterinarian working at AVILESA's four company-owned farms, which are spread over 3 kilometers (1.8 miles) in Jumilla in the shadow of the Sierra del Molar.

"Whether their concerns have scientific merit or if they are just responding to a story they read in a newspaper, we know they are worried about drugs in animal feed."

Perez agrees. “As a company, we need to be sensitive to consumers’ demands. Vaccinating for coccidiosis is helping us produce healthy broilers while reducing drug usage.”

So far the decision to vaccinate appears to be meeting AVILESA’s needs as well. In terms of feed conversion and average daily gain, performance of vaccinated birds is as good as that of birds on medicated feed, Martinez says, noting that average daily gain is about 56 grams (0.123 pound) in mixed-sex houses.

“More importantly, we found that traditional anticoccidials perform better when used in a rotation with a coccidiosis vaccine,” he says.

Filling a void

The boost in anticoccidial performance has been especially helpful following the EU’s ban of nicarbazin in May 2002, adds Perez.

“Nicarbazin was routinely used in shuttle programs and helped the in-feed anticoccidials work better,” he explains. “Without this additive, we need to be more careful with the anticoccidials that are still available to us. Using a vaccine in our program helps keep the anticoccidials working. We don’t have subclinical coccidiosis problems. And when you don’t have coccidiosis, your birds will perform better in all areas.”

Throughout the world, coccidiosis vaccination is expected to play an even bigger role in the future as more poultry companies see how the practice can add flexibility to nutritional programs. Because vaccinated birds are free from the constraints imposed by drug withdrawal times, companies can build feed programs around the nutritional needs of the birds, not the withdrawal times of in-feed anticoccidials.

For example, instead of feeding a withdrawal or finisher feed to the birds for the last 5 to 6 days, AVILESA is considering using this lower cost feed ear-



Vaccinated broilers at AVILESA’s company-owned farm.



Field veterinarian Dr. Juan Martinez (left) and farm manager Miguel Angel Cano.

lier in the flock’s life — possibly at 30 days — to reduce costs without risking a late coccidiosis outbreak.

“Extending the withdrawal feed is something we definitely want to look at,” Perez says. “We want to produce a very high quality carcass. Our slaughter house therefore wants us to use a fixed amount of fat in the carcass, and that fat is given to the birds in the fourth feed for a fixed period of time. We would need to make adjustments to

that if we extended the length of the withdrawal feed.

“At this time,” he continues, “we also want to keep the antibiotic growth promoter in the feed while it is still available to us. But certainly, we have seen the latest research in this area of broiler nutrition. Extending the time for the low-cost withdrawal feed is an exciting, cost-saving option we’ll consider for the future.” (See article on page 5.)



Dr. Cesar Carnicer (left) of Schering-Plough Animal Health discusses coccidiosis-control strategies with AVILESA’s field veterinarian Dr. Juan Martinez and farm manager Miguel Angel Cano.



AVILESA’s four company-owned farms are located in the shadow of Sierra del Molar for optimum biosecurity.

Making adjustments

From a management standpoint, switching to coccidiosis vaccination did not require any major changes at the farms, but Perez acknowledges that removing in-feed anticoccidials may open the door to more enteric pathogens. He is not worried, however, because his feed mill can compensate by making adjustments to the nutritional programs of vaccinated birds.

After making coccidiosis vaccination part of its program, AVILESA discovered one more significant benefit: greater marketing flexibility.

For example, at its four company-owned farms, which have a capacity for 700,000 birds, the company grows standard broilers of 2.8 to 3.0 kilograms (6.2 to 6.6 pounds) in 48 to 50 days. However, at 36 days, AVILESA thins out the flock and markets some birds weighing 1.9 kilograms (4.2 pounds) for small roasters.

“When birds are vaccinated for coccidiosis, the farm manager doesn’t have to worry about withdrawing medication from the feed and leaving birds unprotected,” Martinez explains.

“Now we can put all of the broilers on the same feed and market lighter birds whenever they are in demand,” adds farm manager Miguel Angel Cano. “They’re much easier to manage.”

Cano says this added flexibility is particularly beneficial to AVILESA’s feed mill because the company uses only one feed truck and driver for each farm for added biosecurity. When broilers are on medicated feed for coccidiosis, he says, the mill has to ship separate feeds for the birds that will be marketed early.

Looking ahead

Adding a vaccine to AVILESA’s coccidiosis-management program has also helped the company develop a more strategic, long-term strategy for controlling the costly disease.

“Rather than select treatments as we go along, we already know what our

Reduce Costs, Maintain Production With Extended Withdrawal Feed

Several studies in Spain have shown that birds vaccinated for coccidiosis and grown to 2.2 kilograms (4.85 pounds) or more can be fed low-cost withdrawal or finisher feeds beginning at Day 30 with no adverse effects on body weight, carcass quality or the percentage of premium parts, according to Dr. Cesar Carnicer, a veterinarian for Schering-Plough Animal Health in Spain.

The company has worked extensively with IRTA to develop nutritional guidelines for birds vaccinated with coccidiosis. While more trials are under way worldwide, Dr. Carnicer says a few patterns and conclusions have emerged.

“We know that starter diets must have proper amino acid balance,” he says. “Factors such as vitamin levels and oligo elements also need to be considered.”

“From an economical and nutritional perspective, the only

concern left by extending the finishing feed might be an increased risk for coccidiosis,” he continues. “But in coccidiosis-vaccinated birds, that risk is zero.”

When selecting digestible nutrients for early growth stages when enzymatic systems are developing, consider the chick’s intestinal condition, Dr. Carnicer advises. Using corn instead of white cereals such as wheat and barley, vegetable oil and limiting feed energy or the total protein level (with synthetic amino acids) helps achieve appropriate intestinal development and adequate bacterial flora.

“The strategy is to focus on using a good pre-starter diet and follow with a very digestible feed to achieve an appropriate weight of birds at 25 to 30 days,” he says. “Because you have already focused on digestibility during the most challenging and conflict-filled period of the bird’s life, you have achieved good intestinal health, and you can take steps in the later stages to focus on final body weight and profitability.”

coccidiosis program will be 12 to 18 months from now,” Perez says. “We know how the different feed products work. We know how the vaccine works. We can create a program that employs the strengths of each product.”

For example, Perez says, in late autumn and early winter, *Eimeria* organisms tend to grow and multiply much faster than in the hot, dry months of summer. AVILESA therefore rotates to the vaccine in the fall to introduce a controlled dose of attenuated oocysts that stimulate the natural immunity to coccidiosis.

“If we are going to have rapid growth of *Eimeria* oocysts, we want them to be from the vaccine, not from the wild oocysts in the field that can lead to resistance,” he says.

Coccidiosis vaccine is also used in all of the company’s free-range birds, which are grown to 3.5 to 3.7 kilograms (7.7 to 8 pounds) over 100 to 110 days. Because their life span is more than

twice that of standard broilers, all free-range chickens, or “camperos,” are vaccinated for coccidiosis throughout the year. Continuous use of the vaccine also allows AVILESA to market these birds as being raised without medicinal feed additives.

“We see a lot of benefits from coccidiosis vaccination,” Perez concludes. “It’s helping us control the disease in our standard broilers and specialty market birds. At the same time, it is creating opportunities for us to improve the performance and efficiency in other areas of our operation. We are very pleased with the results of this program.”

Schering-Plough Animal Health and IRTA have worked together to develop a new program called IDEA for managing the nutritional needs of birds vaccinated for coccidiosis. For more information, see Dr. Joaquim Brufau’s article on page 6.

CHANGING PARADIGMS

Trials show benefits of IDEA concept in vaccinated birds



Dr. Joaquim Brufau
IRTA Research Institute, Spain

The success of a broiler operation, particularly its profitability, is very dependent on how well the bird's intestinal tract is functioning. Traditionally, intestinal health has been highly dependent on drugs, but today's emphasis on raising birds with fewer drugs and the increased use of coccidiosis vaccination has changed the situation.

The focus now must be on establishing immunity early to help birds express their maximum potential for growth and feed efficiency. In modern broilers, attention to the first weeks of life is critical for optimal performance later. During this time, high quality nutrients are needed to ensure the development of immunity and proper tissue building in the intestinal tract. In the third and fourth weeks of life, birds are continuing to develop immunity against intestinal disease and still require good nutrition. The relative growth period remains good and should be maximized. Fortunately, this need for special attention to nutrition comes at a time when the volume of feed consumed is relatively small.

After the fourth week of life, the relative growth potential is lower, but feed consumption is higher. If immunity is

not completely established, feed efficiency is not maximized. Figure 1 demonstrates the objective of an efficient management program for intestinal health that is based on early development of immunity and enabling birds to express optimal growth and feed efficiency.

IDEA Program objectives

To help producers maximize nutrition and performance in broilers vaccinated with Paracox-5, Schering-Plough Animal Health Corporation has developed the IDEA Program (See page 17.) It is based on the physiology of the bird and the development of immunity to intestinal pathogens. Its objectives follow:

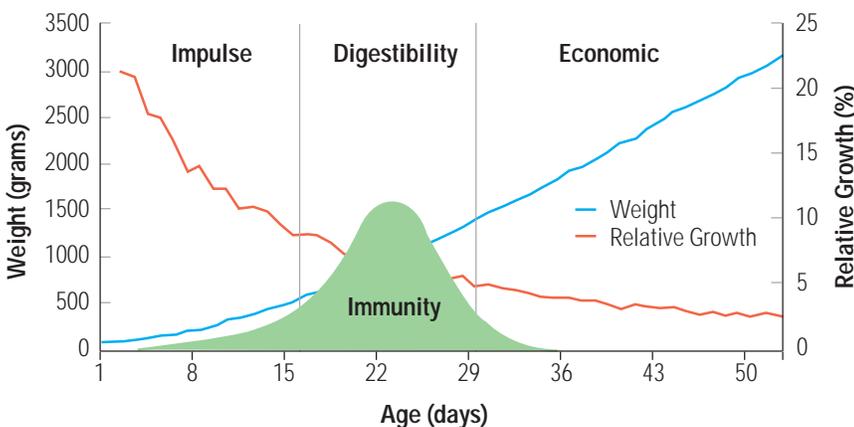
I – Impulse. During the first 2 weeks of life, the goals are to prepare birds for immunity development, optimize development of the intestinal tract and immunity, provide nutrition that guarantees good development of bones and muscles, and take advantage of the high growth potential.

D – Digestibility. During the third and fourth weeks of life, the goals are to maintain intestinal mucosa integrity, reduce exposure to harmful bacteria and guarantee good immune system function.

E – Economic. This part of the IDEA Program is intended to capitalize on compensatory gain and reap the economic advantages that are possible as a result of strong immunity and maximum growth potential.

A – Advance. The IDEA Program helps poultry businesses operate more efficiently at time when resistance to traditional anticoccidials has developed and there are limitations or bans on the use of in-feed growth promoting antibiotics. IDEA provides producers with a

Figure 1. Growth curve, relative growth and timing to maximize efficiency of the immunity process.



model that is not dependent on the use of drugs to maintain good intestinal health.

To demonstrate the importance of the IDEA concept, Schering-Plough Animal Health initiated a series of trials, which are detailed below.

Trial 1

This trial was initiated in partnership with the IRTA Research Institute, Spain, to assess the IDEA Program in Paracox-5 vaccinated birds and traditional nutrition in anticoccidial-treated birds. Figure 2 shows the trial protocol. Figure 3 shows details of the diets provided to birds in the trial.

Trial 1 results

The results, shown in Figures 4, 5 and 6, demonstrate that vaccinated chickens that received a more digestible diet also designed to improve development of the intestinal tract and immune system during the first 4 weeks of life — the Impulse and Digestive phases of the IDEA Program — had the best growth and feed conversion compared to other groups in the trial.

By the end of the trial, all groups had similar performance. The results may not be the same on farms with high density and sanitary and environmental challenges, but an improvement in performance should still be achieved from the Impulse/Digestive phase (0 to 28 days).

Trial 2

A second trial performed at IRTA in partnership with SPAH assessed the

Figure 2. Dietary experimental treatments.

Treatments	Anticoccidial Program	Diets Program
T-1	Drugs*	3 standard diets
T-2	Paracox-5	3 standard diets
T-3	Paracox-5	3 special diets
T-4	Paracox-5	4 special diets

*diclazuril + monensin

Figure 3. Feed formulation and composition for birds in Trial 1.

3 Standard Diets				
	0 – 21 days	22 – 42 days	43 – 45 days	
EM	3050	3130	3175	
CP	22,0	21,0	19,0	
Lys	1,204	1,100	0,928	
Met	0,550	0,480	0,415	
Na	0,14	0,13	0,13	
3 Special Diets				
	0 – 10 days	11 – 30 days	31 – 45 days	
EM	2950	3080	3175	
CP	22,4	21,9	19,0	
Lys	1,406	1,170	0,928	
Met	0,638	0,505	0,415	
Na	0,23	0,14	0,13	
4 Special Diets				
	0 – 10 days	11 – 30 days	26 – 37 days	38 – 45 days
EM	2950	3080	3120	3175
CP	22,4	21,9	20,6	19
Lys	1,406	1,170	1,034	0,928
Met	0,638	0,505	0,465	0,415
Na	0,23	0,14	0,13	0,13

IDEA concept in birds grown to a younger age. Traditionally, coccidiosis vaccination has been considered unfeasible in birds grown to a younger age because they would not have as much time after development of immunity to attain maximum growth and feed efficiency. The Trial 2 protocol is shown in Figure 7 and the feed formulation and composition in Figure 8.

Trial 2 results

As Figures 9 and 10 show, vaccinated chickens demonstrated better performance than drug-treated chickens until day 28 (the Impulse and Digestive phase of the IDEA Program). Final weight and performance in the trial were similar in all groups. Remember that vaccinated birds in the trial had

Figure 4: Performance from 0 to 28 days.

Treatments	Body Weight at Day 28 (g)	Daily Weight Gain (g/day)	Daily Feed Intake (g/day)	Feed to Gain Ratio	Mortality (%)
T-1: Drugs – 3 standard diets	1505 ^a	52,2 ^a	76,1 ^b	1,458 ^a	1,7
T-2: Paracox-5 – 3 standard diets	1512 ^a	52,5 ^a	76,1 ^b	1,450 ^a	2,5
T-3: Paracox-5 – 3 special diets	1576 ^b	54,7 ^b	76,6 ^{ab}	1,400 ^c	1,1
T-4: Paracox-5 – 4 special diets	1565 ^b	54,3 ^b	77,6 ^a	1,429 ^b	1,1

Note: Mean values within a column with different letters (a,b) were significantly different. Values are means of 7 replicates of 48 chickens per treatment.

Figure 5: Performance from 0 to 37 days.

Treatments	Body Weight at Day 37 (g)	Daily Weight Gain (g/day)	Daily Feed Intake (g/day)	Feed to Gain Ratio	Mortality (%)
T-1: Drugs – 3 standard diets	2307	61,2	101,1	1,653	2,0
T-2: Paracox-5 – 3 standard diets	2313	61,3	101,5	1,655	3,7
T-3: Paracox-5 – 3 special diets	2338	62,0	101,8	1,641	1,4
T-4: Paracox-5 – 4 special diets	2334	61,9	102,7	1,660	2,0

Values are means of 7 replicates of 48 chickens per treatment.

Figure 6: Performance from 0 to 45 days.

Treatments	Body Weight at Day 45 (g)	Daily Weight Gain (g/day)	Daily Feed Intake (g/day)	Feed to Gain Ratio	Mortality (%)
T-1: Drugs – 3 standard diets	3098	67,9	122,5	1,804	3,4
T-2: Paracox-5 – 3 standard diets	3076	67,4	121,8	1,808	4,4
T-3: Paracox-5 – 3 special diets	3103	68,0	123,1	1,811	2,8
T-4: Paracox-5 – 4 special diets	3123	68,4	123,8	1,809	3,9

Values are means of 7 replicates of 48 chickens per treatment.

better performance during the initial period of growth.

Trial 3

A third trial assessed the effects of four rations with different combinations of nutritional concentrations during days 15 to 28. Its purpose was to determine if it is possible to have a compensatory response in the final phase of the feeding program.

All chickens in the trial were vaccinated with Paracox-5. One of the rations included a highly digestible pro-

tein source. Traditionally, it has been thought that protein levels should be reduced to reduce exposure to harmful bacteria.

Trial 3 results

The details of Trial 3, which are available from Schering-Plough Animal Health, showed that reducing crude protein levels during the third and fourth weeks of life — the digestibility phase — has a negative impact on performance and that compensatory gain was not seen until 36 days. On the

continued on page 20

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

Q. I HEARD THAT BY USING PARACOX®-5 IN MY FLOCKS, I CAN SAVE MONEY BY REDUCING THE USE OF STARTER AND GROWER FEEDS WHILE INCREASING THE USE OF LESS EXPENSIVE WITHDRAWAL FEED. WHY WOULD THIS WORK FOR PARACOX-5 AND NOT FOR MY REGULAR IN-FEED ANTICOCCIDIAL CONTROL PROGRAM?

A. Since their introduction in the 1960s, anticoccidials and growth promotants have largely determined the duration and design of current poultry rations. There have been refinements in rations to reduce overall feed cost and improve feed efficiency, but the basic principles of starter/grower/withdrawal duration and formulation are still based on maximizing the efficacy of the in-feed medications.

Some of these 40-year-old ration principles have been challenged in the past decade with programs using salinomycin in early feeds paired with a long withdrawal time. Such programs rely on the development of immunity to coccidiosis but, too often, immunity is still developing when high-yield breeds are reaching maximum growth potential. These programs risk a long-term performance loss as field anticoccidial resistance increases. In some cases, full-scale coccidiosis outbreaks have occurred.

Regardless of whether a classic starter/grower/withdrawal ration or a 4-week salinomycin/withdrawal program is used, rations must still be formulated to maximize the efficacy of the

in-feed anticoccidial. These 40-year-old ration concepts were not designed for the high-yield breeds of the twenty-first century.

Paracox-5 stimulates predictable immunity during the early part of the broiler growth curve, before the maximum growth rate occurs. Rations can be formulated more specifically to the physiological needs of today's high-yield breeds. During the first 14 days, rations can be designed to maximize development of the intestine, thyroid and immune system. Birds then "coast" during the immunity-building phase from 14 to 21 days, and the growth curve after immunity is developed can be maximized. These modern-day rations are not restricted by the efficacy requirements of in-feed medications.

Q. WHICH TECHNOLOGY DOES SCHERING-PLOUGH RECOMMEND TO HELP ENSURE EFFICIENT, UNIFORM APPLICATION AND SUCCESSFUL COCCIDIOSIS CONTROL?

A. The best method of applying Paracox-5 has evolved as knowledge and technology have permitted. Initially, the water application method was used, then the spray-on-feed method, and now, hatchery spray is recommended.

The SprayCox II machine with the dual nozzle system for application on chicks has improved vaccination coverage by utilizing a more efficient spray pattern, which increases the amount of vaccine applied directly to the chicks.

Delair Bolis, DVM
Charles Broussard, DVM
Steve Fitz-Coy, PhD
Dr. Luciano Gobbi, DVM
John McCarty, DVM
Linnea Newman, DVM
Rick Phillips, DVM
John Radu, DVM

LAYER PULLETS TAKE THE FLOOR

Cage ban in EU expected to increase coccidiosis pressure

Layer producers in Europe, particularly in Germany, are getting a glimpse of the future — and it's showing a lot more risk for coccidiosis infection.

floors and other alternative systems to get ready for new production guidelines approved by the European Union in 1999.

In fact, new regulations have pro-



Layer producer Erwin Brautmeier (center) with technicians Dietmar Fulhorst and Bruno Fecke. 'This is the way of the future.'

While an estimated 85% of layers in Europe are still reared in cages — an environment where coccidiosis is traditionally not a big threat — more and more layers are being moved to open

hibited the installation of any conventional wire layer cages in the EU since 1 January, 2003. Producers must stop using them altogether by 1 January, 2012 — a short 7 years away.

The deadline looms even larger in Germany, where the German Bundesrat — the country's upper house of parliament — passed the Order for Laying Hen Husbandry banning conventional wire cages on 1 January, 2007.

By 2012, Germany will also phase out "enriched" cages, which are slightly bigger and taller than battery cages and contain some "furniture," such as a shared perch and nest box plus litter, dust bath and a claw-shortening device.

No turning back

Seeing a competitive disadvantage for



Fulhorst sprays coccidiosis vaccine on layer feed. 'That approach has led to more accurate dosing and, of course, more uniform protection.'

German producers, a majority of the state representatives voted in September 2003 to modify the directive for laying hens. They also called for all laying hen husbandry forms to be evaluated for animal welfare and sought permission to extend the use of conventional cages for another 2 years. In addition, they proposed permitting the continuous use of available husbandry systems for laying hens after having them tested by an independent institution.

Germany's secretary of consumer protection, nutrition and agriculture would not sign this decision because she said it conflicted with a decision of the Bundesverfassungsgericht, the German supreme court, which had previously decided that the old German directive for laying hen husbandry did not meet the standards of animal welfare and demanded that a new guidelines would have to include several minimal standards with respect to trough length, the ability to move and rest, and so on.

It therefore appears that all eyes will be on Germany to see how producers there cope with these new regulations and how these changes in husbandry practices will impact bird health.

Coccidiosis, a ubiquitous protozoan disease common in standard broilers and other floor-raised birds, is routinely spread when infected birds shed oocysts of *Eimeria* pathogens in their droppings, which contaminate feed, dust, water, litter and soil.

Fresh oocysts are not infective until they sporulate, usually in 1 to 2 days under optimal conditions — 21-32°C (70-90°F) with adequate moisture and oxygen. Oocysts are resistant to most disinfectants commonly used around livestock. They have also shown resistance to in-feed anticoccidials when those medications are used for extended periods.

More coccidiosis expected

"There are a lot of diseases that you

hardly ever see in battery cages that suddenly come when you put the birds onto the floor. Coccidiosis is the first of them," says Bruno Fecke, a technician at Praxis Dr. Pöppel, a major poultry veterinary practice in Delbrück, Germany — about 15 km (9 miles) west of Paderborn in North Rhine-Westphalia — that specializes in laying



Fulhorst and Brautmeier prepare to vaccinate layers. 'Unlike a feed medication, a vaccine provides lifetime protection.'

hens.

"In floor-reared layers, there are also a lot of bacterial diseases, like cholera and *E. coli*, as well as worms," he adds. "You will have many more challenges to cope with from the disease point of view."

Even so, Fecke thinks having birds on floors is preferable to the free-range option. "The more birds are inside, the less problems you are going to have," he says. "When they are outside, they have more contact with wild birds that can transmit diseases."

From an animal welfare standpoint, the veterinary practice has also been recommending floor-raised layers. "It's an expensive process to make the conversion, but that is the way the industry is going," Fecke says. "Germany is a very 'green' market. Consumers want to buy eggs from the floor."

He estimates that 20% of their customers now have layers on the floor, but that number is growing significant-



Layer chicks are vaccinated for coccidiosis between 5 and 9 days.

ly as the regulatory deadline nears.

Vaccination is best option

Dietmar Fulhorst, a technician at the clinic, recommends vaccinating to protect floor-raised layer pullets from coccidiosis. “Unlike a feed medication, the vaccine provides lifetime protection,” he says. “It also provides an opportunity to reduce antibiotic use.”

One obvious benefit is that many European consumers want their food raised without feed medications. On a more practical note, Fulhorst has found that vaccinated birds grow faster and more uniformly, which pays dividends when the birds are sold at 18 to 20 weeks of age.

“There are two types of production in this area,” adds Fecke. “One of them is production on a very small scale, where producers sell only a couple of hens to each person. In this case, every single hen is important and has to look good. It has to have good legs and color. When they are vaccinated, birds usually look better.”

On larger farms, he says it is important to have good uniformity while birds adjust to a new environment and production system. “Very small birds do not adjust well and will never lay eggs,” he explains.

Laying hens also need to stay healthy to remain productive. Fulhorst says the beginning of laying is “a big stress for the birds, so they can get coc-

cidiosis. And if they get it in that time, you have no treatment available any more.”

Spray on feed

The veterinary practice vaccinates layer pullets with Paracox[®]-8 between 5 and 9 days of age. Many customers’ watering systems do not allow them to get a sufficient concentration of the vaccine to provide the recommended dose, so Fulhorst recommends spraying the vaccine on a tray of supplemental feed.

“That approach has led to more accurate dosing and, of course, more uniform protection,” he says.

One of their large customers, Erwin Brautmeier, raises up to 150,000 layer pullets a year — a very large producer for this area.

“We’re not having problems with coccidiosis anymore,” the producer reports. “More importantly, the producers we sell to are not having any problems with the disease either. Our customers are getting healthier, more uniform birds, and that makes them much happier.”

Brautmeier acknowledges that vaccinating for coccidiosis initially costs more than adding medication to the feed. “But we see it as an investment in the future,” he says. “When you consider that the vaccine provides lifelong protection and you don’t have to worry about withdrawal times, there are many good advantages. This is the way of the

UNDER SCRUTINY

Do phytotherapy products have anticoccidial activity or adverse effects on coccidiosis vaccination?

Dr. Isabelle Guillot, Schering-Plough Animal Health, Germany

Dr. Yannick Frémont, France

In recent years, the animal health industry has witnessed a huge rise in the number of phytotherapy products available. Understandably, there are questions about the efficacy of the products and whether they interfere with coccidiosis vaccination.

Phytotherapy products are mainly marketed as nutritional supplements or appetizers. This has two consequences. First, there are virtually no regulations governing these products; for example, no residue studies are required. Secondly, the makers cannot make medical claims. Nevertheless, product names including “cox” imply anti-coccidial activity.

Efficacy trial against coccidia

To learn if phytotherapy products have anticoccidial activity, Schering-Plough Animal Health Corporation initiated testing of three liquid products by INRA Tours, a French independent research center. Except for oregano and chestnut tannin, product components could not be identified. Two of the three products had names that included “cox.”

There were four groups of birds in Trial 1 (Table 1). Three groups received a phytotherapy product and one group served as a control. All birds were followed until Day 34 and were evaluated for mortality, lesion score, oocyst excretion and weight gain. The pertinent results follow:

- None of the products were effective against coccidia.
- Some of the products resulted in a performance reduction when compared to untreated controls.

- Only one of the products provided an improvement in weight gain 10 days after initiating its administration. Since no action on coccidial multiplication was observed, this effect could be explained by nonspecific immune system stimulation.

Phytotherapy and Paracox®-5 vaccination

Trial 2 was also initiated by Schering-Plough Animal Health and conducted at INRA Tours to see if phytotherapy had any adverse effect on Paracox-5 vaccination (Table 2). On Day 1, phytotherapy products were mixed into the feed, then birds were vaccinated on Day 3. The results follow:

- The vaccinal response (oocysts per gram or OPG and lesion score after challenge) were not affected by the phytotherapy products.
- In Group F, mortality reached 10%, primarily because birds refused feed containing the phytotherapy product the first 10 days of the trial; weight among surviving birds in this group was significantly less than among birds in other groups, showing that the use of some phytotherapy products is not innocuous.



Dr. Isabelle Guillot

Table 1. Protocol for Trial 1.

Group	Challenge (100,000 Oocysts <i>E. acervulina</i> , 10,000 Oocysts <i>E. tenella</i>)	Phytotherapy Day 17 to 22 per Manufacturer's Direction
A	Day 13	Product A
B	Day 13	Product B
C	Day 13	Product C
D (control)	Day 13	—

Table 2. Protocol for Trial 2.

Group	Challenge (100,000 Oocysts <i>E. acervulina</i> , 10,000 Oocysts <i>E. tenella</i>)	Vaccination (Paracox-5)	Phytotherapy Day 1 to 38
E	Day 24	Day 3	Product E
F	Day 24	Day 3	Product F
G (control)	Day 24	—	—
H (control)	Day 24	Day 3	—

Table 3. Protocol for Trial 3.

Group	Vaccination	Oregano, Starter Feed	Oregano, Grower Feed	Challenge
1	Day 0	No	No	Day 38
2	Day 0	Yes	Yes	Day 38
3	Day 0	No	Yes	Day 38
4	—	Yes	Yes	Day 38

Impact of oregano on vaccination

Trial 3 was initiated by Schering-Plough Animal Health and conducted at TGD Bayern, an independent German research and diagnostic laboratory, where the impact of oregano on vaccination was studied (Table 3). Birds were vaccinated by gavage. Oregano was administered in feed according to manufacturer recommendations, and oocyst excretion was recorded daily.

After the end of vaccine excretion on Day 38, birds were each challenged with 10 doses of Paracox-5. This non-virulent coccidiosis vaccine was used because the trial site was not isolated. The trials showed that:

Vaccine response was similar in all three vaccinated groups. In other words, oregano did not interfere with coccidiosis vaccination. In fact, the vaccinated group that received oregano in starter feed excreted more oocysts at Day 10 than other groups.

Oocyst excretion after challenge was low in all vaccinated groups due to

developed immunity. Coccidial excretion was higher only in the group that received oregano, which shows that oregano has no impact on coccidial multiplication.

Conclusion

Based on the phytotherapy products tested in these trials, it appears that phytotherapy products have no anti-coccidial activity nor do they affect vaccination with Paracox-5.

It is possible that some phytotherapy products that were not tested in these trials might have benefits such as natural growth promotion or regulation of gut flora. If this is the case and poultry producers choose to use a phytotherapy product, it appears that they can do so without fear that the product will interfere with coccidiosis vaccination.

1. Detailed results for all trials in this article are on file at Schering-Plough Animal Health Corporation.

INTESTINAL FORTITUDE

Understanding the real cause of intussusception in broiler breeders leads the way to effective control

It isn't pretty. Birds develop an inflamed gut that folds over itself. There can be a high incidence of prolapse (the gut protrudes out of the vent) and associated cannibalism.

The term for this intestinal condition is *intussusception*. It tends to occur in the thin-walled lower intestine when mild enteritis causes the muscle of the intestinal wall to lose tone and spasm. Intussusception can affect birds of any age, but is usually seen in 7 to 10 week-olds.

"We see the condition in laying hens and replacement pullets, but not often in broilers," says Dr. Luciano Gobbi, a poultry veterinarian and consultant in Italy.

Dr. John McCarty, a consulting poultry veterinarian based in Florida, says that while no one really knows the actual incidence of intussusception, it's believed to be on the increase.

"I recently spoke with one live production manager who said that about 25% of his flocks have problems with intussusception, which affects about 2% of birds within those flocks," he says.

In severely affected birds, intussusception usually leads to death. Milder cases cause poor performance and lack of uniformity in the flock, he says.

A variety of factors contribute to intussusception, says Gobbi. One is the overgrowth of disease-causing bacteria, such as *Escherichia coli*, *Clostridium* and campylobacter. Worms can also lead to intussusception and so can parasites such as coccidia, particularly when due to *Eimeria necatrix*.

McCarty adds, "We usually see intussusception in flocks with a high parasite load. A hyperactive gut is also thought to be a cause."

Targets feed restriction

The real root of the problem in birds with intussusception, however, is management practices that set the stage for bacteria or parasites to build up, causing the enteritis that leads to intussusception, the veterinarians agree.

Dr. Rick Phillips, technical services director for Schering-Plough Animal Health Corporation, has had extensive experience with intussusception and says, "Feed restriction is the driving force behind intussusception."

The increased incidence of intussusception is in direct line with increases in feed restriction that have been implemented by breeding companies over the past decade. In replacement pullets, most cases of intussusception are seen 7 to 10 days after a period of food restriction, he says.

Geneticists have, understandably, strived to improve the growth rate of birds.

"But a fast-growing parent usually turns into a fat one that doesn't lay well, so we've tightened the screws on feeding programs to keep hens on their ideal weight curve," he explains.

Consider that in 1982, a 7-week-old broiler breeder had the genetic potential to reach 4.0 pounds, but was held to a weight of 2.25 pounds. Today, a 7-week old broiler breeder has the potential to grow up to 6.5 pounds, but is held to a weight of 1.4 to 1.8 pounds,¹ says Phillips.



Photo shows gaseous distension of the small intestine loops. Enlarged veins are clearly visible on red, inflamed serosa. Intestinal contents appear as liquid, undigested feed mixed with fecal material and necrotic debris.

“The chicken’s intestine was designed to house a steady state of fill with feed material. If the intestines empty, the intestinal villi — vascular structures on the intestinal wall that are essential for good intestinal health — begin to die. The result is an overgrowth of bacteria and possibly other harmful microorganisms,” he says.

Feed restriction also forces pullets to forage in litter, which can further compromise intestinal health. Litter material is rough and can damage the intestinal mucosa.

“Further complicating the situation is the absence of antibiotics in feed,” Phillips says. “Growth-promoting antibiotics are often left out of replacement breeder feeds to help restrict bird growth, but without them, bacterial growth goes unchecked, leading to enteritis.”

Role of coccidiosis

McCarty says that some producers mistakenly believe that the mild reaction to coccidiosis vaccination, which is necessary to establish immunity, is the cause of enteritis.

“But that’s not the case. The peak reaction to live coccidiosis vaccination occurs at 3 weeks of age, and intussusception doesn’t usually occur until 7 to 10 weeks,” he says.

When coccidiosis is the cause of enteritis and intussusception in coccidiosis-vaccinated birds, the more likely culprit is inadequate vaccination, McCarty says.

If the vaccine is diluted, providing only a partial dose, or the vaccine is not applied correctly, birds do not develop adequate immunity and become susceptible to field challenge between 6 and 10 weeks of age, he says.

Another cause of inadequate immunity in birds vaccinated for coccidiosis is the inappropriate use of amprolium,

which can disrupt proper cycling of the vaccine, he adds.

Managing intussusception

For acute intussusception, the underlying enteritis has to be treated with antibiotics such as sulfas or bacitracin fed either in water or feed.

Repeated problems can be alleviated by using bacitracin methylene disalicylate or virginiamycin in the pullet feed, if permitted, during the time that intussusception is a problem.

“The coccidiosis-control program and its contribution to intussusception should be evaluated,” Gobbi advises. If birds are receiving a partial dose of coccidiosis vaccine or amprolium treatment before 3 weeks of age, they will not have adequate immunity against coccidia.

He also suggests that producers evaluate pullet feed allotments. Normal Aviagen or Cobb pullets should clean up feed in 1.5 to 2 hours. Short clean-up indicates that the feed allotment is insufficient.

“Look at your feed pans or tracks to see if birds at the end of the line are getting sufficient feed. If not, you could have a problem with the speed that feed is being disbursed,” he says.

It may be necessary to increase the allotment, adjust the way it is administered, or change the formulation. “For instance, pullet diets can be reformulated to a lower calorie feed, allowing birds to eat more bulk while remaining within the calories allotted by week,” Gobbi says.

“Last but not least, don’t forget the water. Consumption must be about 3 pounds of water per pound of feed consumed (or 3 gallons of water for every 8 pounds of feed) to take advantage of the full caloric content of feed.”

1. *Broiler Industry*, August 1996.



A BETTER IDEA

Management and environmental techniques that boost intestinal health in birds raised without in-feed additives — a practical approach

Dr. Delair Bolis, Schering-Plough Animal Health, Portugal

Dr. Luciano Gobbi, Schering-Plough Animal Health, Italy

Controlling intestinal disease without drugs is a growing trend among poultry companies around the world due to public concern about drug residues in food as well as the high level of resistance to some of the in-feed drugs that are still available. In North America and Western Europe, for instance, more than 10% of poultry production today is achieved without in-feed anticoccidials. The goal is to produce meat without feed additives while maintaining competitive production costs.

On page 6 in this issue, Nutrition Notebook focuses on dietary approach-

es under the IDEA Program that help ensure intestinal health in birds raised without anticoccidials. The IDEA concept has been successfully used in several countries. It was designed by Schering-Plough Animal Health Corporation to make the most of nutrition and performance in coccidiosis-vaccinated birds. It seeks to enhance immunity development and reduce intestinal challenges by coccidia and bacteria without the use of drugs. Although nutrition is key to IDEA, so are feeding management and environmental considerations, which are the focus of this article.



Dr. Delair Bolis

Is for Impulse

Coccidiosis vaccination early in life is vital to the success of drug-free production. It improves coccidiosis control and provides performance comparable to that achieved with in-feed anticoccidials. It reduces concern about drug residues in meat, increases feed and slaughter flexibility and revitalizes anticoccidial sensitivity.

Uniform coccidiosis vaccine administration and effective uptake by the bird are essential because they lead to primary immunization of the flock and oocyst recycling, which provide a booster effect. All birds in a flock must start the oocyst cycling process together on day 1 or up to 3 days of age. Birds should also be vaccinated as needed for other diseases such as Marek's and Newcastle.

Feeding management

Newly hatched chickens need immediate access to solid feed and water to set the stage for good performance later. Birds need to achieve maximum duodenum villi development in the first week and maximum jejunum and ileum villi development during the second week of life after hatching. If they do not, they will probably have less than optimal digestion and absorption throughout life, evidenced by feed in feces and a high feed conversion.

Feed availability, particularly when chickens are less than 10 to 14 days of age, is crucial. During brooding, maintain normal feeding plates so chickens can easily find and reach feed. This is very important for small chickens, such as those that are the progeny of layers 30 weeks of life or younger.

continued on page 18



Dr. Luciano Gobbi

Chickens less than 10 to 12 days old should have access to supplemental feed dispensers or paper lanes where crumbled feed is distributed daily. This minimizes litter-picking, which results in ingestion of excessive bacteria, viruses and coccidial oocysts. Premature removal of extra feed sources must be gradual and based on the general condition of birds upon their arrival at the farm. The “eye and hand” of the poultry attendant can make the difference between success and failure, since careful consideration must be given to issues such as when to remove supplemental feeder pans, give birds more space or move them to the full house.

Generally, chicks from mothers 30 weeks or younger must have supplementary feeders and drinkers for a longer time than broilers from older hens.

Environmental management

To grow well, brooders require the proper temperature, humidity, ventilation, lighting and litter management.

- **Temperature.** Until 14 days of age,

chickens need either heating lamps or hot air fans/conveyors positioned within the poultry house.

- **Humidity.** During the first 3 to 4 days after placement, relative humidity in the house must be about 60% to 70%.

- **Ventilation.** Very low air flow exchanges may be adequate during the first days on the farm — say, 0.003 cubic meters/bird/minute — but must be gradually increased as chickens grow. The ventilation rate should be increased immediately if ammonia becomes a problem.

- **Lighting.** Chickens less than 2 weeks old need bright light (i.e., 18 to 20 lux), which increases bird activity, helps them locate feed and, above all, the “invisible” water supply (nipple drinkers!).

- **Litter management.** Generally, litter quality is more important than its vegetal origin. For instance, litter should be free of dust, molds and any toxins. Wood shavings, hull rice or even a mixture of the two to make the litter layer more friable are the best choice if available.

D Is for Digestibility

Between 3 and 4 weeks of life, birds are challenged by bacteria and coccidia, but their immunity is still not completely developed. Under the IDEA concept, this is the time that producers need to focus on feeding and environmental management that improves digestibility.

Feeding management

Gut mucosa at 3 and 4 weeks is subject to lesions due to histamine and

in-feed biogenic amines or toxic ingredients. Intestinal irritation can open the door to second invaders, mainly bacteria. The result can be intestinal dysbacteriosis or intestinal disturbance as well as subclinical necrotic enteritis. *Clostridial perfringens* types A and C play a major role, but other bacteria can be involved.

Cereals should allow for proper digestibility. High quality feed and an optimal enzyme dosage should be provided. Dietary fat should be of high quality and easily digestible.

Protein levels should be adjusted as needed since excess undigested protein encourages growth of undesirable bacteria.

Soybean meal should not be used as the only protein source; it can lead to excess potassium and reduced digestibility. Synthetic amino acids are preferable. AGP alternatives, such as probiotics, prebiotics, organic acids, betaine, tannins, essential oils and others, can be used.

Environmental management

- **Lighting.** After 10 to 14 days of life, light levels must be gradually reduced in intensity (approximately 5 to 7 lux in darkest on-floor areas). Low lighting keeps birds calm, and reduced activity results in better weight and

low feed conversions. Do not drop the level of light suddenly so that birds cannot find feed or water.

- **Litter management.** Wet litter can result in poor digestion and malabsorption. There is a quantitative correlation between litter moisture and necrotic enteritis.

- **Other considerations.** If affordable, consider using a competitive exclusion product to foster a good balance of intestinal microflora and reduce the likelihood of clostridium overgrowth and emergence of conditions such as necrotic enteritis.



Is for Economy

Producers who have used the management approaches outlined above should

have chickens that reach 30 days of age with good intestinal health. Immunity is developed and it's now time to take advantage of the compensatory gain by moving on to a withdrawal diet sooner than usual.



Is for Advance

The "A" in IDEA represents the overall program goal of maximizing per-

formance in birds that depend on good immunity for optimal gut function. It also reflects advances made in the areas of intestinal disease management and profitability.



Figure 7: Protocol for Trial 2.

Treatments	Anticoagulant Program	Feed Additive
T-1	Drugs*	None
T-2	Paracox-5	None
T-3	Paracox-5	Agent to improve intestinal integrity

* Narasin + nicarbazin from 1 to 15 days and monensin from 16 to 36 days.

Figure 8: Feed formulation and composition for birds in Trial 2.

	0 – 15 days	16 – 28 days	29 – 36 days
EM	2950	3040	3120
CP	22,0	21,3	20,6
Lys	1,406	1,207	1,034
Met	0,638	0,553	0,465

other hand, increasing crude protein levels during this time, since the ingredient has high digestibility, improves performance without increasing exposure to harmful bacteria. Increasing the digestibility of the protein fed was highly beneficial, even when the total protein fed was lower.

The trial also showed that a good concentration of nutrients during the

first 4 weeks of life is very important for maintaining the integrity of intestinal mucosa. It appears to be more useful than increasing energy levels later in an attempt to take advantage of the compensatory gain.

General conclusions

Trials have demonstrated that the IDEA Program helps develop and maintain the integrity of intestinal mucosa. The IDEA approach promotes improved nutrition early in life and yields performance just as good as the performance of unvaccinated birds receiving traditional anticoagulant treatment. IDEA can enable poultry producers to get the most from Paracox-5 vaccinated birds.

Trial 3 shows that performance is enhanced if the digestibility of the protein fed is improved during the time that immunity is developing. It has been shown to be more important than altering levels of crude protein.

Schering-Plough Animal Health is committed to working with the poultry industry toward the goal of finding additional opportunities for further improvement in cost-effective nutrition for broilers.

Figure 9: Performance in Trial 2 birds from 0 to 28 days.

Treatments	Body Weight at Day 28 (g)	Daily Weight Gain (g/day)	Daily Feed Intake (g/day)	Feed to Gain Ratio	Mortality (%)
T-1: Drug (maxiban - monensin)	1310 ^b	45,4 ^b	65,6 ^b	1,444	2,9
T-2: Paracox-5	1360 ^a	47,2 ^a	68,8 ^a	1,458	2,5
T-3: Paracox-5 + intestinal integrity agent	1361 ^a	47,2 ^a	68,8 ^a	1,456	1,7

Note: Mean values within a column with different letters (a,b) were significantly different. Values are means of 7 replicates of 48 chickens per treatment.

Figure 10: Performance in Trial 2 birds from 0 to 36 days.

Treatments	Body Weight at Day 36 (g)	Daily Weight Gain (g/day)	Daily Feed Intake (g/day)	Feed to Gain Ratio	Mortality (%)	European Production Index
T-1: Drug (maxiban - monensin)	2124	57,9	90,5	1,562	3,4	358
T-2: Paracox-5	2148	58,6	92,6	1,580	3,1	359
T-3: Paracox-5 + intestinal integrity agent	2164	59,0	93,2	1,580	2,2	365

Values are means of 7 replicates of 48 chickens per treatment.

Feed Mill Logistics Aren't a Problem When Initiating Coccidiosis Vaccination



Dr. José Ignacio Barragan

The logistics of producing feed with and without anticoccidials is sometimes viewed as a stumbling block to initiation of coccidiosis vaccination, but it need not be a problem, says Dr. José Ignacio Barragan, poultry veterinarian and independent nutritional consultant in Spain.

Let's say a producer wants to start vaccinating against coccidiosis on January 1. On December 30, the feed mill stops making the F1 or starter feed with the anticoccidial.

Meanwhile, birds prior to that have had the feed with the anticoccidial for 21 days. By January 20, those birds are 20 days or older.

On January 19, the feed mill produces 1.5 kg (3.31 pounds) of F2 or grower feed for each bird under anticoccidial control. "This means a minimum of an additional 12 days of consumption. The worst case scenario would be if the feed mill is able to produce only 1 kg (2.2 pounds) per bird, which would be additional 8 days of consumption," he says.

On January 20, the feed mill produces F2 without anticoccidial for all the birds that received coccidiosis vaccination.

All birds in the anticoccidial program will have medicated feed for up to a minimum of 33 days and it's unlikely there would be a problem with coccidiosis. As a precaution, the birds could be given amprolium at 35 days — but it probably wouldn't be necessary, Barragan says.

Antibiotic Use in Animals On the Decline, Study Shows

The volume of antibiotics used in the mammoth US animal health market, including in-feed anticoccidials, dropped nearly 8% in 2003 compared to 2002, according to a survey of animal health companies.

In 2003, 8,644,638 pounds of ionophores/arsenicals were used, compared to 9,050,957 pounds in 2002. However, in 2001, only 7,758,492 pounds of these products were used, according to the survey, conducted by the Washington-based Animal Health Association (AHA).

Antibiotics that also were on the decline from 2002 to 2003 included cephalosporins, macrolides, lincosamides and other "minor" classes of antibiotics, as well as aminoglycosides, sulfonamides and penicillins.

The use of fluoroquinolones and tetracyclines increased during the same time period, according to AHA, which says the study included antibiotics used in both farm and companion animals.

Steve Collins, vice president, worldwide poultry for Schering-Plough Animal Health Corporation, says that the study in part reflects public concern about the use of antibiotics in food animals and comes as no surprise considering the dramatic increase in the use of non-antibiotic methods of disease control, such as vaccination for coccidiosis in poultry.

"Seven of the top 10 poultry companies in the United States have used vaccination as part of a long-term, integrated strategy to control coccidiosis in broilers," he notes. "That's a tremendous leap from only a few years ago."

Nevertheless, antibiotics are and will remain an important part of animal health care, he says. "The trend is toward more thoughtful, judicious use of antibiotics in food animals, and that's a positive development."

Got a Story Idea for *CocciForum*?

The editors of *CocciForum* welcome news tips and story ideas from its readers around the world. If there's a particular subject you'd like to see covered in a future issue — perhaps a specific area of coccidiosis management — please let us know. Write to JFeeks@prworks.net or call 508-627-6949 (US). We want to hear from you.

SprayCox AirMix Technology Simplifies Mixing of Oocysts

Vaccinating against coccidiosis with the SprayCox spray cabinet will be even easier with the addition of new AirMix technology.

AirMix is a simple air pump that keeps the vaccine's oocysts suspended during mixing, says Paul Townsend, the tech engineer at Schering-Plough Animal Health who developed the original SprayCox and its latest improvement.

Currently, Coccivac and Paracox vaccines are mixed in a 10-liter carboy — a large container — that is connected to the SprayCox unit with tubing. A magnetic spin bar within the carboy mixes the vaccine solution and is powered by an electric motor that spins a magnetic bar underneath the carboy.

However, if the spin bar is thrown off center from the magnetic stirrer, spinning stops and oocysts fall to the bottom of the carboy. "This is not detectable except by looking inside the

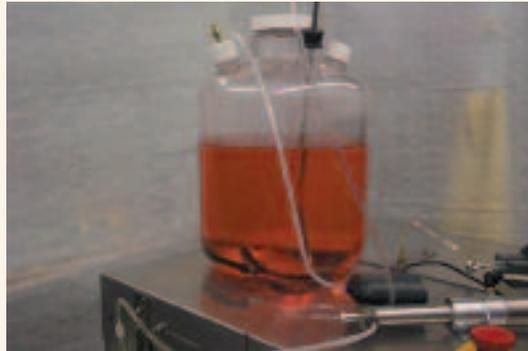
carboy, which is only done when refilling," Townsend explains.

To solve the problem, he came up with the idea of using a small air pump and flexible air diffuser within the carboy. It's the same device used in aquariums and emits fine air bubbles that keep the oocysts suspended, he says.

Testing has indicated that use of the air pump will provide a much more reliable method of mixing the vaccine solution, Townsend says.

This latest improvement comes on the heels of SprayCox II, an updated version of the spray cabinet that features better placement of nozzles. Vaccine spray stays in the box and there is virtually no overspray on the machine or on the floor.

For more information about the new SprayCox design or to upgrade existing equipment, contact your local Schering-Plough Animal Health representative.



Danish Authorities OK Paracox-5 After Rigorous Testing

Schering-Plough Animal Health has secured regulatory approval to sell its coccidiosis vaccine for broilers, Paracox-5, in Denmark.

Even though Paracox-5 has been registered throughout the EU since 2000 and despite significant sales in many of the markets, the vaccine could not be sold in Denmark because of testing requirements and problems unique to that country, explains Rod Watson, regional senior director for Europe and the Middle East, Schering-Plough Animal Health.

Denmark has a national screening and eradication program for Newcastle disease virus (NDV) that involves *in vivo* testing for extraneous agents. The test, however, takes several months to complete, beyond the shelf life of Paracox-5.

Even though all Paracox vaccines are produced in disease-free birds in a GMP plant in an NDV-free country, and even though every single batch is tested for extraneous agents, Danish authorities wanted to abide by the rules of their own program, says Watson.

In addition, if testing according to the Danish program turned up a false positive, then supplies of Paracox-5 could have been delayed throughout Europe, he says.

Alternative test

To solve the problem, Schering-Plough Animal Health's regulatory affairs department consulted with the Danish Medicines Agency and concluded that an alternative *in vitro* test, such as a PCR, could be used in place of the current *in vivo* test. The

company's Research and Development team then came up with a suitable test.

Headed by Dr. Mike Francis, the team started by consulting with scientists from the Veterinary Laboratories Agency, UK, which is the European reference laboratory for NDV. They developed a plan for an *in vitro* RP-PCR test that could detect small amounts of NDV genetic material within the vaccine. They also designed bird studies to prove that this level of antigen could not possibly lead to seroconversion — or active Newcastle disease in birds vaccinated with Paracox-5.

After more consultations, the test was included in the company's standard manufacturing quality control procedures for Paracox-5, with a plan to use it as soon as the Danish authorities accepted the methodology, he says.

After that, Schering-Plough Animal Health had to validate the suitability of the test, which required more rounds of testing.

One bonus finding was that the sterilization treatment used to make Paracox-5 would destroy NDV, eliminating the risk of a bird contacting NDV from the Paracox-5 vaccine, Francis says.

All the work that was accomplished was compiled into an audited report and sent with supporting documentation to Danish regulatory authorities. Within a week after its receipt, the authorities granted permission to sell Paracox-5 in Denmark, he says.



Dr. Mike Francis



Blending Nutrition into Coccidiosis Management

A few years ago, when we started *CocciForum* magazine, we didn't realize how quickly nutrition would become part of our editorial planning. This latest issue is a good example of that trend.

On the cover, for instance, you'll see a veterinarian and feed mill worker in Spain examining a random sample of feed before it's shipped to a broiler farm. And on page 6, you'll find a new feature we're introducing called Nutrition Notebook, where leading specialists in the field will share their latest ideas for maximizing performance. In this issue, even our Technically Speaking column — one normally reserves for health topics — has a nutrition angle.

Why the heavy editorial emphasis on nutrition? Two reasons.

First, our readers have been requesting it via *CocciForum* reply cards or through direct communication with the editor. They recognize that our magazine's focus is coccidiosis, but they've also learned that nutrition can play a big role in successful and profitable control programs. They want to learn even more.

Second, over the years most mainstream poultry companies have turned to vaccination for at least a part of their coccidiosis-management program. In the US, for example, seven of the top 10 broiler companies have taken this route. Similar trends are being seen in other major poultry markets in Latin America, Europe, Asia and the Middle East.

Initially, most of these companies switched to coccidiosis vaccination to "break up the cycle" of traditional in-feed anticoccidials, many of which were losing effectiveness after continuous use. Others saw vaccination as a good way to meet growing and regulatory demand to use fewer drugs in animal feeds.

Today, poultry companies like AVILESA (page 2) are experiencing even more benefits from coccidiosis vaccination. For example, they've learned that it allows them to be more flexible with their marketing. In addition, they've discovered that feed programs can be more profitable if they don't have to work around prescribed treatment regimens and withdrawal times associated with traditional in-feed anticoccidials. In other words, broiler feed programs can be adjusted to meet the needs of the birds, not the requirements of the drug.

Nutrition and poultry health specialists are also teaming up to develop innovative programs such as IDEA, which provides a roadmap for maximizing the performance and profitability of broilers (see articles beginning on pages 6 and 17).

As the recognized leader in coccidiosis management and an ally of the world poultry industry for nearly a century, this publication's sponsor, Schering-Plough Animal Health, feels an obligation to "surround" coccidiosis management and bring you all sides of this rapidly evolving story. Nutrition is one good example. In future issues, we'll continue to report on even more developments in technology that will help you manage this costly, prevalent disease.

Our readers tell us they learn a lot from our magazine — and for that we're grateful. We also learn a lot from our customers and other experts in the industry. It is our privilege to share their ideas with you in *CocciForum*.

Stephen P. Collins
Vice President, Worldwide Poultry
Schering-Plough Animal Health Corporation

P.S. Please take a moment to complete the accompanying reply card or send an email to the editor at JFeeks@prworks.net. We want your feedback on the magazine.

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