The Poultry Practice
POULTRY PRODUCTION PRACTITIONERS

NEWSLETTER

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INTRODUCTION

Its hard to think that Easter has been and gone and we are already in May.

When South African poultry producers start going into winter, we all remember the devastating events of 2 years ago when the country caught the Avian flu and many farms were put out of action. While there is no indication that there is going to be another outbreak, it is always wise to review biosecurity and put better systems into place. We have responded to that concern by publishing an article with information about vehicle disinfection. Vehicles are often implicated in spreading diseases from one farm to another and introducing diseases into a farm. Vehicle disinfection should not be taken lightly.

Although brooding practices are well known, we still see many problems that arise in broilers as the result of poor brooding practices. Most of these problems cannot be reversed once they have occurred and therefore it is important to optimise the brooding period to maximise profits in broilers.

Another area of poultry science, which is becoming increasingly important is the area of gut health. Increasingly we recognise that a healthy gut will absorb nutrients optimally. A healthy gut membrane is the key to preventing bacteria from invading into the body and causing devastating disease. There are many interventions that can improve gut health.

Feather and vent pecking can be a major problem when they occur. Birds can cause significant damage with persistent pecking. We discuss the causes of this distressing condition as well as potential pit falls and how to avoid them.

Finally, we have seen an increase in the incidence of Salmonella Gallinarum and we therefore discuss the signs and symptoms of this potentially devastating disease.

We welcome feedback from our readers and would be prepared to answer questions that are of interest to all.

Please send your questions to deryn@thepoultrypractice.co.za

Herman, Deryn, Ferdi & Nadia

DISEASE UPDATE

The main problem in South Africa at present appears to be an Infectious Bronchitis (IB) challenge in the layers. There are many farms in a wide section of the country which have experienced production drops that have been attributed to IB. In some cases, the QX strain has been isolated, but in many cases, there have been no diagnostics done and this makes it difficult to advise people on how to respond.

In most cases, the outbreaks have been in layers and have been accompanied by steep drops in egg production (up to 20%) and not many white eggs. There are not often increases in mortality. As most pullet rearers vaccinate well for QX, it is strange that this strain is apparently causing issues. This is why its important to verify the IB strain. Although it is not easy to do this, speak to your vet about taking samples.

Salmonella Gallinarum (SG) is still an issue on various farms in South Africa. This is a very difficult disease to get rid of in a multi-age site and almost impossible if houses have dirt floors. If the SG9R vaccine is used, it is important that all birds on the site are vaccinated properly to prevent the vaccine from spreading to unvaccinated birds and causing disease. (For more information see the SG article).

Further afield, it appears that the Avian influenza outbreaks in Europe have declined. Only one H5N8 outbreak has been reported in Bulgaria and a few H5 outbreaks (not N8) in Asia. As we go into this period, it is important to check bird proofing and up the biosecurity.

WHAT IS INTESTINAL HEALTH

AND WHY IT IS IMPORTANT IN POULTRY PRODUCTION?

The genetic evolution of the broiler chicken has produced a remarkable bird that is able to grow at a phenomenal rate. Broilers grow from a 40 g day old chick to a 1,8 to 2kg slaughter bird in just over a month. This is while maintaining a feed conversion ratio of 1.5 to 1.6. This means that for every 1.5 kg of feed a broiler consumes the bird puts on 1kg of body weight. Layer birds may not have the incredible growth rate of broilers, but they are still remarkable birds that can lay around 300 eggs in a 350-day layer cycle. There are no wild birds on earth that have this incredible growth rate and reproductive rate.

To attain this incredible growth rate and reproductive rate the modern chicken, broiler and layer respectively, needs to be able to efficiently ingest their feed, digest their feed and absorb the nutrients in the feed. Thus, making intestinal health of vital importance in modern poultry production.

A healthy intestine relies on a combination of the following.

- A healthy diverse intestinal microbiota, bacterial population in the intestine
- A healthy intestinal barrier that prevents the bacteria and toxins in the intestine from entering the body but still allows nutrients to be absorbed
- A healthy intestinal immunity that assist the intestinal barrier function in keeping the bacterial population in he intestine under control.

To attain the immense growth rates seen in modern broilers, broilers are selected for high feed intake. This selection for high feed intake puts strain on the intestine of a broiler which can lead to an imbalance in the intestinal micro flora leading to digestive disturbances which will ultimately affect the growth and reproductive ability of the chicken.[1]

How does a high feed intake result in bacterial enteritis?[1]

- A high feed intake results in an increase in undigested feed in the intestine.
- Undigested feed reaching the large intestine results in an overgrowth of enteric bacteria esp. Clostridium perfringens in the hindgut.
- This results in the Clostridium perfringens disturbing the balance of the intestinal microbiota in the intestine.
- The imbalance of the intestinal microbiota results in intestinal inflammation which will negatively affect the function of the intestine further decreasing the digestion of feed.
- This will result in the chickens developing bacterial enteritis and even necrotic enteritis.

The best way for a farmer to ascertain the intestinal health of their birds is to examine the droppings of the birds on a daily-bases. Chickens produce two kinds of droppings; faecal droppings from their colon and caecal droppings from the caeca. The ratio of faecal to caecal dropping production is about 7:1.

Normal droppings are firm with no watery border, no gas bubbles and no undigested feed. (Figure 1 & 2) Any deviations from the normal i.e. increase volume of faeces, presence of a watery border around the faeces, presence of undigested feed, mucous and/or gas bubble in the faeces as illustrated in Figure 3 - 5 above are indications of the presence of bacterial enteritis.[2]

Figure 1 - Normal Faecal droppings

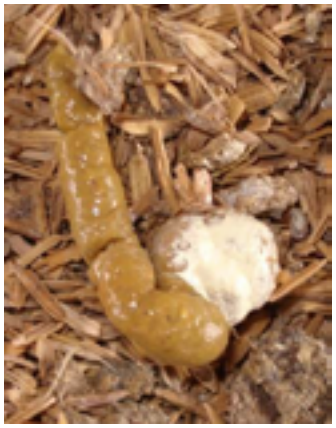

Figure 2 - Normal Faecal dropping

Figure 3 - Abnormal Faecal dropping

Figure 4 - Abnormal Faecal dropping

Figure 5 - Abnormal Faecal dropping

Maintaining of intestinal health and prevention of the development of bacterial enteritis requires the following interventions;

- **SUPRESS THE PROLIFERATION OF PATHOGENIC INTESTINAL BACTERIA**

  The main bacteria implicated in the development of bacterial enteritis in poultry is Clostridium perfringens. Antibiotics are effective in supressing the growth of pathogenic gram-positive bacteria, for e.g. Clostridium perfringens, but antibiotics will also supress commensal bacteria in the intestine which can further disturb an already unbalanced intestinal microflora.[3&4]

  Probiotics that have been proven to inhibit Clostridium perfringens have been shown to be beneficial in the prevention of bacterial enteritis. An example of such a probiotic is Bacillus subtilis

PB6 which has been proven to directly inhibit Clostridium perfringens while sparing the commensal bacteria for example Lactobacillus and Bifidobacterium. Thus, balancing the intestinal microflora. [3, 4 & 5]

- **MAINTAINING THE INTESTINAL BARRIER FUNCTION.**

  The intestinal barrier consists of a single layer of cells called intestinal enterocytes that are bound together with trans membrane intestinal tight junction proteins. This single layer of cells has to perform two very contrasting functions.[6&7]

  - Absorb nutrients
  - Prevent the absorption of toxins and bacteria.

  Feeding chickens butyric acid that has been encapsulated has been shown to significantly improve the feed conversion ratio of broilers. This is directly related to the effect of the butyric acid to improve the intestinal barrier function. The pungent smell and high volatility of free butyric acid precludes the use of unencapsulated free butyric acid in animal feed.[6&7]

- **IMPROVING INTESTINAL IMMUNITY**

  The intestine is the largest immune organ in the body. A balanced intestinal immunity and a healthy intestinal barrier function will assist in improving intestinal immunity. Intestinal immunity can be enhanced by feeding birds with β Glucans, these are indigestible glucose fibres that have been shown to enhance intestinal immunity.[8&9]

  Enhancing intestinal immunity via the use of Linear 1,3 Glucans has been shown to lower the effect of a coccidia challenge in broilers and to enhance the response of vaccines in poultry. This is directly related to the enhancement of intestinal immunity. [8&9]

- **IMPROVING THE DIGESTIBILITY OF THE FEED**

  The digestibility of the feed can be enhanced via the selection of raw materials in used in the feed. The digestibility of the feed can be further enhanced via the use of exogenous enzymes.[1]

CONCLUSION

In conclusion improvement of intestinal health involves a holistic approach that involves enhancing the natural defences of the gastro intestinal tract. This involves balancing the intestinal microbiota, improving and maintaining the intestinal barrier function, improvement in intestinal immunity and improving the digestibility of the feed.

REFERENCES:

1. Broiler signals, a practical guide to broiler focused management. 2016. Roodbont Publishers. Zutphen, the Netherlands.
2. Kemin document BR-2012-00057
3. Jayaraman. S. et al., Bacillus subtilis PB6 improves intestinal health of broiler chickens challenged with Clostridium perfringens-induced necrotic enteritis. 2013 Poultry Science 92 :370–374. http://dx.doi.org/ 10.3382/ps.2012-02528
4. Teo A. Y.L. & Tan H.-M., Effect of Bacillus subtilis PB6 on Broilers Infected with a Pathogenic Strain of Escherichia coli., 2006 J. Appl. Poult. Res. 15:229–235
5. Abdelqadera. A. et al., Effects of dietary Bacillus subtilis and inulin supplementation on performance, eggshell quality, intestinal morphology and microflora composition of laying hens in the late phase of production. Animal Feed Science and Technology 179 (2013) 103– 111
6. Guilloteau. P. et al. From the gut to the peripheral tissues: the multiple effects of butyrate. Nutrition Research Reviews (2010), 23, 366–384
7. Levy. A.W. et al., Effect of feeding an encapsulated source of butyric acid on the performance of male Cobb broilers reared to 42 d of age. 2015 Poultry Science 94:1864–1870 http://dx.doi.org/10.3382/ps/pev130
8. G. Horst. et al., Effects of beta-1,3-glucan (AletaTM) on vaccination response in broiler chickens. 2018 Poultry Science 0:1–5 http://dx.doi.org/10.3382/ps/pey523

9. R. Levine. et al., Evaluation of the effects of feeding dried algae containing beta-1,3-glucan on broilers challenged with Eimeria. 2018 Poultry Science 97:3494–3500 http://dx.doi.org/10.3382/ps/pey227

Figure 1. BR-2012-00057. **Figure 2.** IMG KA 00078. **Figure 3.** IMG-KA-00056. **Figure 4.** IMG-KA-00055. **Figure 5.** IMG-KA-00075

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BROODING

The brooding of broiler chicks can either make or break an organisation. Unfortunately there is no "golden brooding recipe" for maximum productivity, as there are multiple factors that influence the genetic potential of these birds (i.e. housing, feed, incubation, breed, parent flock age... AND THE LIST GOES ON AND ON).

We can see ourselves as the "Mother hen" during the production cycle, ensuring that the chicks are as comfortable and healthy in the environment that we create for them. This "ideal" environment can only be created if we spend time in the houses, adjust the environment according to what the birds "tell" us. A good stockman/-woman is someone who can create the ideal environment using the bird's behaviour in its current environment as a guide.

Brooding is affected by what happens to the eggs are set in the incubator. This already accounts for 21 days of the production cycle, and there are many factors that influence the quality of the chicks that hatch from the eggs. During the first ten days after the delivery of chicks, these birds cannot maintain their body temperature and are influenced by environmental temperature. Given the average production cycle duration of 34 days, the brooding period accounts for more that 30% of the production cycle. In short; if one slips up during the brooding period, it is very difficult to recover the lost genetic potential.

What is the goal of brooding?

- Stimulate early feed intake for accelerated growth.
- Promote gastrointestinal, cardiovascular and skeletal development.
- Flock uniformity
- Maintain a good feed conversion

An easy way to evaluate the house brooding.

- Use the "FLAWS" system.
  - **F**: Feed
  - **L**: Light
  - **A**: Air
  - **W**: Water
  - **S**: Sanitation and disease
- Most of the problems and risk occur between 12:00am and 06:00am.

PRE-HEATING AND EARLY BROODING

The pre-heating of houses should take place at least 48 hours before arrival of day-old chicks. The aim is to minimise the drop in body temperature from the hatcher to the new environment. (Cloacal temperature of day-old chick is 40-40.5°F for the first 4 days, and then thereafter 41-42°F).

The ambient temperature should be between 32-34°C, the concrete temperature should be

28-30°C and litter temperature should be 30-32°C. CO2 levels should be less than 3000pm and RH% less than 70%.

FLAWS

FEED:

Maximise feed intake! Feed and water consumption go hand-in-hand. The chick needs to consume 20-25% of its own body weight in feed and 45-50% of body weight in water. For every gram of feed, it consumes, it drinks about double the amount of water.

Poor early feed and water intake will result in:

- Poor uniformity
  - Uniformity at placement 7-8%
  - End of production cycle <10%
  - Depressed early feed and water intake will cause a poor uniformity that cannot be corrected later!
- Poor average daily gains (ADG)
- Poor seven-day weights
- High mortalities

Early feed and water intake will stimulate the development of a healthy intestines through the development of healthy villi in the gut that will maximise the digestion and absorption of nutrients – healthier birds throughout the cycle!

Above can be achieved by giving "Supplementary feed" on chick paper. Chick paper:

- Should be placed on each side of drinker lines.
- Should make up about 45-55% of brooding area.
- 70-75g/chick should be placed on chick paper.
- Should last for at least 4 days.

Try to achieve at least 4.2 – 4.5 times of the day old chick weight at 7 days of age. (40g x 4.5 = 180g)

Use Crop fill to evaluate early feed and water intake:

- 2 hours after placement – 75%
- 12 hours after placement – 85%
- 24 hours after placement – 95%
- 48 hours after placement – 100%

LIGHT:

Legislation of the amount of Lux to be used varies between countries

- Light should be evenly spread in house and be as uniform as possible without dark spots in the house. Maximum variance of 20%.
- Minimum of 25 lux in the darkest place in the house during brooding.
- After 7 days 5 – 20 lux

Light programs differ between breeds and facilities.

Simple program:

- First 24 hours after placement – 0 hours sleep
- Day 1 to weight of 160g – one-hour sleep
- Thereafter depending on weight 8 hours sleep

Make sure that the "Lights off" time stays the same during whole cycle, as the birds come into routine to fill up crops before lights off.

AIR:

1. <u>Temperature:</u>
   Ambient temperature should be managed to achieve a cloacal temperature of 40-40.6°C during the first 4-5 days of brooding.

2. <u>Air quality (Guidelines):</u>
   - Carbon Dioxide (CO2) less than 3000ppm
   - Oxygen >19.8%
   - Carbon Monoxide <10ppm
   - Ammonia <10ppm
   - Relative Humidity 45-55%

   Failure to achieve abovementioned will lead to:
   - Reduced activity

- Decreased feed and water consumption
- Poor uniformity and poor weight gain
- Risk of increased incidence of Ascites
- Dehydration

Chick activity and distribution through the house will give a good indication of requirements. When chicks group together against the wall, CO2 may be too high and chicks sitting where most of the Oxygen is available; when air is falling or draft over chicks; litter may be cooler in that area or there is no feed and water available.

WATER: *(to be discussed in later issue)*

Water quality is easily overlooked BUT can be detrimental! Chicks consume twice as much water in comparison with feed.

Chicks need to consume about 1ml/hour per chick during the first 24 hours.

Water temperature should be <25°C. Water lines should be flushed before day old chick placement. Thereafter, flush the water lines regularly to maintain a temperature of below 25°C.

Nipple height and flow rate very important and should be evenly distributed. This will ensure that water is easy accessible for all chicks. Nipple flow rates should be approximately 40ml/minute.

CONCLUSION:

Brooding is the most important period for optimal expression of the genetic potential of the broiler. One needs to spend time in the houses with the birds to make observations and ultimately enable us to make calculated changes to their environment. There is no better computer screen than our 5 senses! AND unfortunately, no shortcut or "Golden brooding Protocol".

STICK TO THE BASICS

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FEATHER PECKING & CANNIBALISM

Birds peck each other all the time. This is a way to establish the hierarchy in a group. However, occasionally pecking can be very destructive and can result in flock mortality. This should be called destructive pecking to distinguish it from other forms of pecking.

Hugh and Savoy distinguish 5 types of pecking

1. Aggressive pecking – this is when the dominant birds peck the less dominant and usually the head and the neck are attacked.
2. Gentle pecking without removal of the feathers. This establishes the social structure of the birds
3. Severe feather plucking leading to bare areas
4. Tissue pecking in the denuded area (this must be distinguished from back scratches, which occur when there is limited access to the feed and birds scramble to get what there is).
5. Vent pecking (often related to prolapses which will be covered in another newsletter).

Although these categories are helpful, one type of pecking may lead to another. Once there are birds in a flock that peck feathers, the rest of the flock may learn to peck as well and the mortality from this activity may rise as high as 30%.

CAUSES OF FEATHER PECKING

1. Genetics – there is little doubt that some breeds of layers are more prone to feather pecking than others. Attempts to breed this out have not met with much success, as the trait is not very heritable.
2. Absence of litter, or wet poor-quality litter can predispose to feather pecking. Conversely, supplying litter to birds reduces pecking behaviour.
3. High stocking density, large group sizes will also increase feather pecking. This may be as the result of increased stress but also damage to feathers that occurs as the birds brush up against each other.
4. Strong light is known to predispose birds to pecking – this is especially so in rearing.
5. Certain housing systems that increase competition for feed may cause stress and aggression in birds leading to feather pecking. Feather pecking is more prevalent in free range than in caged layers.
6. Feather damage due to mites and other causes
7. Transport stress for pullets
8. Nutritional factors- these will be discussed in more detail.

NUTRITIONAL FACTORS

There are several dietary factors that result in feather pecking. Protein deficient diets (11% or less) are known to cause feather pecking but this would be unusual in the modern diet. Deficiencies of methionine and cysteine (the sulphur containing amino acids necessary for feather production) will predispose birds to peck. These amino acids contribute to the development of the feathers and it is well known that poor feather development contributes to feather pecking. Lysine and arginine may also play a role. Lysine is important for feather development. Diets low in arginine (3.9%) have been associated with severe feather pecking in 4 w old cockerels. Dietary supplementation with high doses of Tryptophan (21 g/kg) has been shown to decrease the severity of feather pecking.

Minerals like magnesium, zinc and sodium (salt) can protect against the occurrence of feather pecking. Magnesium only appears to be significant if the dietary protein and phosphorous is low. Zinc should be supplemented at 52ppm or higher in diets. Low sodium diets have been associated with increased feather pecking. None of these things should be a problem in a balanced diet.

Diets that are low in energy and higher in fibre are also indicated to reduce boredom and stress.

Once feather pecking is established, it is very difficult to stop it. It is easier to prevent it from happening than stop it. Reducing stress and feeding a balanced diet is key to reducing feather pecking. In the next edition we will discuss vent pecking.

This information is based on an article by van Krimpen et al in the World Poultry Science Journal 2005, as well as the DEFRA guidelines for practical management of feather pecking and cannibalism in free range layer hens.

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SALMONELLA GALLINARUM

Salmonella Gallinarum(SG) also called fowl typhoid has been eradicated in many countries but is still a problem in South America, parts of Asia and Africa . It is relatively easy to eradicate with single age sites, regular testing of pullets and parents and good biosecurity. It has always been a particular problem of layers although it can occur in breeders and even broilers. It is closely related to Salmonella Pullorum also called Bacillary White Diarrhoea -which does not appear to be prevalent in South Africa. Many people have been asking how it is that SG is spreading so quickly, and we have identified two main factors. The practice of buying eggs into a pack station that is situated on a farm is one fraught with risk (not only for SG spread but many other diseases) and the risk factor is the selling of infected culls.

SG is a devastating disease and many people who have had disease outbreaks say it is worse than Newcastle disease. Birds become sick and exhibit huddling anorexia and tend to die acutely. Any birds that survive may become carriers. In the case of breeders, the disease may be transmitted via the eggs to the progeny. Although it is possible to treat this disease with antibiotics, the recovered birds are often carriers, and therefore the SG tends to come back at the end of the treatment.

Post mortem findings include enlarged livers and spleens (up to 3 times enlarged spleen) and livers may have a bronze colour. Liver samples must be taken for bacterial culture and the lab must be alerted to the possibility of SG.

At present, the only vaccine that is registered for use in South Africa is the SG 9R vaccine which is a weakened(attenuated) field strain. This vaccine must be injected and causes a mild to moderate infection in the birds which results in immunity. Because of this, the birds shed the bacteria for as long as 8 weeks after vaccination. Immunity is only effective for 8 to 10 weeks after vaccination and if there is a challenge, it will be necessary to vaccinate the birds every 10 w. Under no circumstances should this vaccine be used in the water as it tends to become virulent and cause outbreaks. All birds that are housed on a site must be vaccinated, as the bacteria seems to spread from vaccinated to unvaccinated birds.

It is important to note that SG although closely related to Salmonella Enteritidis(SE) does not affect humans, and eggs from infected houses are safe to eat. SE and many other salmonellae cause food poisoning . Because SG is closely related to SE, it is possible to use some but not all of the SE vaccines (those with somatic antigens) to vaccinate against SG.

SG is a controlled disease in South Africa and the state vet of the area must be notified.

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FOCUS ON VEHICLE BIOSECURITY

Biosecurity is one of those areas where 90% attention to detail is simply not good enough. Any area of biosecurity where the focus is less than perfect may be the area where disease is carried in. This applies especially to vehicle disinfection. Vehicle disinfection is often an area where there is a half-hearted application of the biosecurity principals. I often think this is worse than no vehicle biosecurity at all, because it creates a false sense of security.

For vehicle biosecurity to work, involves a complete set of protocols for EVERY vehicle (with no exceptions) that enters and exits the farm. Care must be taken to use vehicles that can easily be disinfected. It is probably correct to say that the disinfection of the outside of the vehicle is the least important part of the disinfection process. What is inside the vehicle (on the people or the equipment) , or in the load space, is likely to result in a bigger risk of contamination.

The first step in vehicle biosecurity is to ascertain where the vehicle has been prior to its arrival on the farm. This is normally done by using a register that can be consulted in the event of a biosecurity breach. The security guard or worker who does the disinfection should be instructed to phone into the office with the information on the register so that people and vehicles who are not compliant with the protocol can be turned away.

Cleaning of the interior of the vehicle should occur before proceeding to address the exterior. Any dirty clothing or personal protective equipment (PPE) should be removed from the interior of the vehicle. the door handles, steering wheel, controls, and floor mats should be disinfected. A broad spectrum, non-corrosive, easy-to-use, all-in-one cleaner and disinfectant wipe would be an effective product to use for the door handles, controls and steering wheel. The floor mats should be removed from the vehicle, sprayed to eliminate dirt and debris, cleaned

with a disinfectant before reinstalling. Drivers footwear should be disinfected prior to re-entry into the cab area.

It is important to insist that vehicles arrive on the farm clean to begin with. Do not put the vehicle disinfection station in the site or too close to the site. Organic material that is washed off during disinfection may contaminate the site. Although the disinfectant is meant to kill microorganisms, organic material can actually protect the bugs and prevent them from being killed by the disinfectant. Cleaning the load space of the truck whether it be the hatchery vehicle, or the cull vehicle is especially important. Any equipment in the load space must also be cleaned and disinfected.

Wheel base disinfection and back pack sprayers are not suitable for vehicle disinfection. Wheel base systems are hard to keep clean as the sand and mud tends to accumulate in them, while back pack sprayers do not provide enough pressure for removing debris that may be stuck. High pressure sytems with foaming lances are in my opinion the most effective, but an overhead spray race can be effective if steps are taken to slow the vehicles down and the angles and number of the nozzles are correct. The best way to check your vehicle disinfection is to look for spots on the vehicle that are still dry. Applying disinfection to the wheels of the car is largely pointless unless there is recent evidence of mud and organic material. In general, however, the rotation of the wheels at high speeds generates enough heat to eliminate microorganisms.

The choice of disinfectant is important. Use a broad spectrum, non-corrosive disinfectant solution to eliminate all disease-causing agents, including bacteria, viruses and fungi. During the disinfection process, it is important that no part of the vehicle escapes the application. All safety warnings on the label necessary to protect personnel are adhered to.. The combination of glutaraldehyde with a quaternary ammonium is especially effective. Peroxide oxidizing agents like Virkon while effective, are highly corrosive and are not commonly used.

Attention to detail is extremely important It only takes the slightest amount of organic material on a vehicle to harbour an infectious agent that could provoke a catastrophic disease outbreak.

This article is adapted from an article in the Watt Poultry Magazine (March 2019)

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