

Freshly mixed vaccine provides solid protection against PCV2 and M. hyo

by Peter Best.

Less work in protecting pigs against two of the most prominent and costly swine disease threats – this is the tempting prospect offered by the newest vaccination products now on the international market for use in controlling the type-2 porcine circovirus PCV2 and the enzootic pneumonia mycoplasmal pathogen known as M. hyo. Now there are more trial data to confirm that the effectiveness of protection is maintained by a combined vaccination technique at weaning even while labour is saved.

It marks the latest chapter in a long running story of vaccine development to fight PCV2 and M. hyo and so avoid the expensive production losses that they cause. The story was already notable for successes, not least the fact that vaccination to control these two agents has become widely used internationally.

In the United States, for example, surveys have found that over 95% of all slaughter pigs are vaccinated against PCV2. According to the same survey evidence, more than 80% of US slaughter pigs are vaccinated against both PCV2 and M. hyo.

Negative economic impact

Such widespread usage testifies to the massively negative economic impact of the infections, of course.

Porcine circovirus disease (PCVD) is associated not only with wasting of piglets, poorer growth and higher mortality rates, but also with a wide range of additional herd health challenges due to co-infections with other pathogens. Infection with Mycoplasma hyopneumoniae starts the development of enzootic or mycoplasmal pneumonia that leads to slower growth and to the formation of lung lesions in slaughter pigs.

Both of these pathogens are found in pig herds throughout the world. Unfortunately, even intensive and well managed biosecurity measures struggle to block them from entering a premises and spreading among the resident animals.

Attempts at stamping out or elimination are rarely affordable or feasible. The one

	Control group	Freshly mixed combination	Ready to use combination
Treatment	2 x 2ml Week 3 and 6	1 x 2m Week 3	2 x 2ml Week 3 and 6
Number of pigs	292	1024	1022
Weight at start (kg)	4.91	4.99	4.99
Market weight (kg)	121.3 ^b	124.1 ^a	122.8 ^b
Average daily gain (kg)	0.758 ^b	0.780 ^a	0.767 ^b
Days to market	154.4 ^a	153.3 ^b	153.8 ^{ab}
Mortality (%)	3.46 ^d	1.27 ^e	1.47 ^e
Cull rate (%)	4.6 ^d	1.67 ^e	3.33 ^d

^{ab} Means differ (P≤0.05). ^{de} Means differ (P≤0.05)

Table 1. The effect of treatment on pig performance and mortality (Payne and Cline 2012).

action that has proven consistently effective against them is to vaccinate and so give the pigs a shield of immunity that stops PCV2 and M. hyo from causing clinical problems.

However, the veterinary experts advise that the results of vaccination depend on the protocol that is followed on the farm. A first point to consider is exactly when to vaccinate – meaning, at what age.

The optimal time-frame for vaccination does vary in practice – it is affected by several factors, such as the infection sequence of each pathogen, the extent to which vertical transmission plays a part in the chain of infection and also the influence of maternal immunity. On the plus side, we now have an array of diagnostic procedures that help to identify the most likely time for vaccinating effectively.



With PCV2, a common decision is to vaccinate the pigs at or around weaning. But the situation with M. hyo is more complicated. Discussions about the timing of vaccination in this case most often involve the development of the infection process and the duration of maternal interference.

Without doubt the majority of M. hyo infections take place at the late nursery stage or in grow-finish pigs, even though on a few farms colonisation can already be detected at weaning. On the other hand there are plenty of data suggesting that some interference from maternal antibodies occurs for at least the first two to three weeks of life.

Considering both factors, veterinarians often favour the option of vaccinating around weaning also for M. hyo. Such timing avoids the period of maternal interference and allows solid immune protection to develop before infection with the mycoplasma is likely to arise.

Obviously what this means is that the weaning stage will be chosen by many herds as the vaccination point for their protective strategy against both PCV2 and M. hyo. The overlap in timing has persuaded vaccine developers to devise combination products that would allow a single injection at weaning to act against multiple pathogens.

Various different vaccine combination

Continued on page 14

Continued from page 13

concepts have been developed with this labour saving idea in mind. They range from vaccines which can be freshly mixed on the farm to combinations which have been combined in the manufacturing process.

In either category, the most important question must always be whether combining the vaccine agents diminishes their ability to protect. After all, the decision taken by pig producers and veterinarians on which product to use against a certain pathogen is dictated primarily by vaccine efficacy, before any consideration of possible labour economies in application.

Specifically for PCV2 and M. hyo, a number of vaccination products have

reached the global market that combine the two antigens. Differences from one product to another may revolve around their exact antigens and adjuvants, also whether the combination is pre-manufactured in a ready-to-use form or a pair of mono-vaccines that are licensed to be freshly mixed before use. In addition, products differ for the vaccination schedule proposed for their use.

Development experience has demonstrated several ways in which different antigens or vaccines may interfere with each other when used in a combination.

The interference may be physical, since the components of different vaccine fractions can potentially bind and interact with each

other during storage. Or, it is possible that the immune reaction to one antigen modulates and influences the immune response to the second antigen present.

Reports including to the 2010 International Pig Veterinary Society Congress have observed that although mixing together vaccines against PCV2 and mycoplasmal pneumonia for administering as a single injection can cause less stress on the animals besides reducing the workload in vaccination, vaccines should never be combined unless the mixing is supported by the manufacturer and is done according to appropriate guidelines.

Especially important, said these reports, is to avoid combining vaccines that contain different adjuvants, because this can result in the vaccination failing to protect the pigs effectively. So the compatibility of the antigens and adjuvants in a combination is crucial for protection efficacy.

Field trial

A field trial reported to a more recent IPVS Congress has put this to the test by comparing pig performance in terms of growth, culling and mortality after vaccinating according to each of two protocols. One group of pigs was left as an unvaccinated control. A second group received a single injection using a 2ml dose of a freshly mixed PCV2/M. hyo combination. In the third group, by contrast, vaccination involved giving a pre-manufactured ready-to-use combination product as 2ml doses in two injections spaced 17 days apart.

Blood tests for the side-by-side trial confirmed that the pigs had received an M. hyo and PCV2 challenge during the finishing period. The overall average daily gain was significantly higher in treatment group 1 compared to the non-vaccinated controls and treatment group 2.

Also by comparison with the non-vaccinated pigs and those in treatment group 2, as Table 1 shows, the members of treatment group 1 had a significantly lower culling rate.

The observations of the trial team further supported the idea that administering the two antigens in one dose cut the work involved in vaccinating and minimised the animal welfare impact of the vaccination.

But the key point, they indicated, was that the performance details revealed a better level of protection from applying the freshly mixed vaccine combo. To state these conclusions another way, a one-dose combination vaccine can save you time in immunising your pigs in order to combat PCV2 and M. hyo, but be aware that the products on the market for this purpose do differ in terms of their efficacy. ■

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References are available from the author on request