2015

Antimicrobials Study Tour: Holland

PHWC

Pig Health and Welfare Council

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1.0. Antimicrobials Dutch study tour

On 16 June 2015 a contingent from the UK visited Holland on a fact-finding mission to determine what approaches to antimicrobial stewardship, in use in the Netherlands, would be of benefit to the UK industry, as well as the lessons learnt from their experiences. The group comprised representatives from the National Pig Association (NPA), Veterinary Medicines Directorate(VMD), AHDB Pork, veterinary practices and producers with a particular interest in antimicrobial stewardship.

The Dutch Governments approach was outlined by the Deputy Chief Veterinary Officer Elzo Kannekens in his presentation

The day was structured in two parts, with a morning of presentations followed by a site visit to a Dutch pig farm, to gain an insight into the experiences in the field. The presentations were given by Elzo Kannekens (Dutch governmental Deputy Chief Veterinary Officer), Hetty van Beers (Director of the Dutch Veterinary Medicine Authority), John Vonk (veterinary practitioner and president of the Swine Practitioners Group (VGV) of the Royal Dutch Veterinary Society and Rutgar Jansen (veterinarian at ForFarmers). The talks covered the Dutch approach to managing antimicrobials on farms as well as the social and political pressures that have led to the current measures in place. Each of the discussions focused on a different perspective from industry and provided a detailed impression of how the Dutch have approached antimicrobial stewardship.

The afternoon focused on a more practical insight into how a Dutch pig farm operates under the current regulations and what measures have been adopted. It was also an opportunity for the UK contingent to see what key management practices, technology or innovations were being adopted in the face of restrictions on antimicrobial usage.

2.0. The history of antimicrobial resistance in Holland

The approach the Netherlands has taken was initially fuelled by a discrepancy between the views of the consumer, society and the livestock sectors with regard to antimicrobial usage. Livestock production in the Netherlands is significant when compared to the relative land mass of the country. Pork production is one of the largest livestock systems, just after poultry, with 12 million pigs and 100 million poultry (but also 1.5m sheep and Goats and 4m cattle) within a country of 34, 000 square km. This land is also shared with a human population of 17 million which means that close proximity to livestock production is inevitable. Societal concerns for the potential risks of livestock to human health had been present for a number of decades, but a series of outbreaks of Q fever, originating in goats from 2007-2011 in the south of the Netherlands started to raise public concern. Its causative agent *Coxiella burnetii* is zoonotic, meaning that humans can become infected by the disease.

During this outbreak thousands of people became infected, resulting in livestock farming being perceived by the general public as a threat to human health.

The public concern for the sustainability of livestock production within Holland led the Dutch government to review the strategies of veterinary care in livestock and, in particular, the potential risks of overuse of antibiotics in animals leading to increased antimicrobial resistance. In addition, increases in the levels of –livestock-associated MRSA in pigs throughout Holland triggered strict and often punitive measures against livestock farmers entering, or visiting, hospitals in order to reduce the potential risk of LA MRSA spread to other patients from farmers.

The Netherlands already considered itself to have one of the most responsible, restrictive and selective use of antimicrobials in the medical sector but one of the highest levels of antimicrobial use within the veterinary sector. Politically, this was considered to be of concern, especially as the use of antibiotics as growth promotors had been banned within the EU since 2006. So stricter measures on prescription and treatment using antibiotics were investigated by the government. Decoupling of the prescription and dispensing of veterinary medicines were considered as part of this review (already seen in Denmark) but were ultimately not adopted.

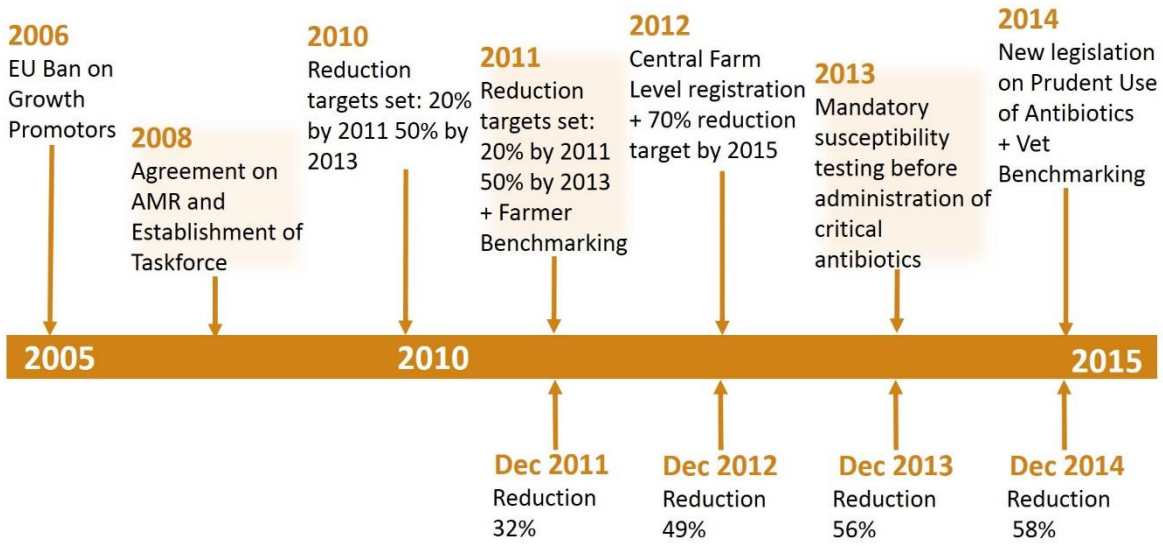
3.0. The Dutch approach to reducing antimicrobial usage

The Dutch livestock sectors implemented a number of steps to start to reduce the numbers of antimicrobials used. This included a centralised registration system for antimicrobial usage, improvements in herd health management, banning of 3rd and 4th generation cephalosporins in the pig sector. There were also action plans for farmers using high levels of antibiotics and support provided by the Dutch Veterinary Medicines Agency (SDa). These measures were set in place in 2011 following changes to the Products Boards Regulation and recommendations were laid out:

- Prohibition of preventative use
- Professional Guidelines for veterinary use of antibiotics
- Professional medication guidelines adopted (1st, 2nd and 3rd choice antibiotics)
- Mandatory susceptibility testing before using 3rd choice antibiotics
- Restrictions on the use of critically important antibiotics.

The model for the policy adopted was based on the industry self-regulating, with centralised and government surveillance and enforcement. The system relies on full transparency on antimicrobial use and all antibiotics used being recorded on the database. The Dutch Veterinary Medicines Agency (SDa) is responsible for monitoring, benchmarking and supervision of databases. The farmers and veterinarians are responsible for the development and delivery of on-farm herd health and treatment plans. These plans are mandatory and are vital to the success of the reduction

targets which have been put in place.



Following a concerted effort in Holland in 2010, rapid progress has been made to the overall reduction of antimicrobials used on farm by 2014. There has been a 58% reduction in the overall use of antimicrobials in all the livestock sectors, since the implementation of the reduction strategy in 2011. It is too early to tell if the 2015 target of 70% will be reached but the approach so far appears to have been considered. The year 1 (20%) and year 3 (50%) reduction targets have been demonstrably easy to achieve; however, the year 5 target (70%) may be more challenging to reach.

4.0. How does the regulatory system work?

Hetty van Beers (Director of the Dutch Veterinary Medicine Authority) Outlined the role of her organisation in regulating antimicrobial usage in Holland

The recording and benchmarking of farmers and vets in Holland is administered by the Dutch Veterinary Medicines Agency (SDa). The structure of the SDa is somewhat different from its comparable UK organisation, the Veterinary Medicines Directorate (VMD). The SDa is a devolved non-governmental agency, which is funded by both government and the livestock production sectors themselves. The SDa is overseen by a supervising committee as well as several advisory councils, expert panels and focus groups. This structure allows the agency to remain independent as, although it is funded by both government and industry, there is no one stakeholder who is dictating the direction the organisation is taking.

Data is sent to the SDa from the farmer and/or the vet and this is then analysed by the SDa, which sets the thresholds and reports the results back to the industry. The SDa is responsible for the benchmarking and improvement of non-compliant producers and veterinarians.

The current system using the animal daily dose per year (ADD/Y) as the means to calculating usage, utilising this quantity. There are three categories a farm can fall under: *Target* – which means that there is no action required*, Signalling threshold* – where the levels of antimicrobials used require attention and *Action threshold* –which then requires direct actions to be taken on that farm. Integral to this approach are the farm assurance schemes which set additional measures to both the farmers and vets and help to bring a more holistic approach to direct the farmers to reduce antimicrobial usage. If farmers, or vets, fall outside the yearly targets for antimicrobial use, the Food and Consumer Product Safety Authority is tasked with visiting farms and veterinary practices to investigate why the targets were not achieved and to set in motion measures to effect change.

There are also restrictions on the way in which antibiotics can be selected and prescribed for use in animals. Drugs are classified into four main strata, 1st, 2nd and 3rd choice antibiotics as well as a banned classification for certain products. There is a requirement to justify the use of all antibiotics, even those classified as first line treatments. Bacterial testing, such as culture and sensitivity, is required for this, even if it is being used retrospectively from the treatment of the condition.

While this stratification of use for antimicrobials is not a legal requirement in the UK, the Pig Veterinary Society (PVS) has guidelines for its members on the use of antibiotics classified in a similar way and this is considered to be the required framework for professional practice in the UK.

5.0. The vet perspective on how the industry has changed since the new regulations

The structure of the pig industry in Holland before 2009 was discussed and there has been a significant change to the industry over the past decade. Initially, the Dutch pig industry comprised a large number of small pig producers, who were supported by small independent feed mills, transport companies, veterinarians and slaughterhouses. On farm, water and water quality was not considered to be of importance and many farms used a wet feed system, which may have contained 'risky' components. If there was any management failure on a particular farm, then antibiotics would be used as a way of bringing that under control but, ultimately, this resulted in the problems on farm being masked.

Increased public pressure and societal concern on the perceived potential impact that agriculture may have on public health drove changes in regulation, but also radical changes in the industry itself. Since 2009, there has been a significant upscaling of farm production, resulting in fewer but significantly larger farms in terms of size and production. The industry has also seen more of a move towards specialisation, with staff trained in particular areas of pig management as well as fewer but more specialist feed companies and slaughterhouses. As seen in other countries across Europe, veterinarians have also become more specialised, with large animal practices separating from the traditional 'mixed' approach and 'expert' teams of pig veterinarians being established.

An additional driver to the veterinarians becoming engaged with the drive towards reducing antimicrobial usage was the issue of prescription decoupling. The initial debate on how the antimicrobials strategy would be implemented in Holland included the topic of decoupling prescription and dispensing powers from the veterinarians, in a similar manner to that seen in

Denmark. Ultimately the Dutch government decided against decoupling but benchmarking of vets has been developed as part of the scheme. Benchmarking of vets is not without its limitations and so it is currently being seen as an early warning system for the veterinarian to see how their producers are faring overall against their contemporaries.

Veterinarians and producers are now working together on the wider health, welfare and farm management aspects of pig production to help to reach the industry targets. This has meant a significant focus on producing units with high health. Good biosecurity is now commonplace on Dutch pig units. The housing design and, in particular, the ventilation but also nutrition and genetics are playing a part in this 'high health' approach. In addition, the use of vaccinations has increased since the targets on antimicrobial usage were introduced. This has resulted in a 68% increase in vaccine usage in Holland, with approximately 56 million doses of vaccines in 2014 being used during the year. These are primarily vaccinations against PCV2, mycoplasma and PRRSv.

Unfortunately, the picture is not universally positive. The societal concerns which have driven the move towards regulations on antimicrobials have also had an impact on farms in other ways. There is now, sometimes, a tension between the local farmers and the community in which they live. This can sometimes be seen as a mistrust by the public towards their farming neighbours. The Dutch public health department continues to carry out research on perceived public health risks on areas such as fine dust and endotoxins around pig farms. There has also been a change in legislation meaning that permits are required to establish a farm, of which an audit of the public health risk is an integral part. There is a feeling within the agricultural sector that the work already carried out by the Dutch pig industry is not being well recognised, or reported effectively to the general public. In the face of these societal pressures and also the economics of modern Dutch production, there has been a trend towards increasing consolidation of the pig sector. This has seen the development of fewer farms which are significantly larger in size but it has also seen a significant number of smaller Dutch producers going out of business.

6.0. The feed industry perspective on how the industry has changed since the new regulations

Since 2011, in-feed medications have been banned in Holland, which was as a direct result of proposed new Dutch guidelines on the production and transport of medicated feedstuffs. The main concern around the proposed newguidelines was that the level of carry-over would be reduced from the current level (5%) to a new lower level of 2.5%. The Dutch legislation was never implemented,as a total removal of medicated feed was considered preferable to the potential challenges of implementing the 2.5% carry-over level in medicated feed. Currently, there is an EU-wide proposal which could see a similar situation imposed across Europe. As in-feed medication is currently not being used in Holland it will put the Dutch pig industry at a competitive advantage if the EU measures are put in place.

Carry-over is where antimicrobials incorporated into medicated feeds can potentially cross-contaminate the next batch of feed being produced. This is generally an issue at the mill and is made more difficult by the ability of most of the carriers included in the powdered antibiotics to stick to metal surfaces. Prevention of carry-over can be expensive for the feed manufacturer in terms of feed that is wasted and must be disposed of, as well as the downtime of the plant and cost

of cleaning. However, it is not only the mill that has to observe carry-over, as transportation of medicated feeds also falls under the same restrictions and requires meticulous cleaning of lorries between batches of feed. Proposed reductions in carry-over are aimed at reducing the risk of selection for antimicrobial resistant bacteria but will add significantly to the cost of the product and, in practice, it can be difficult to achieve very low levels.

The Dutch industry moved to an alternative approach to delivering oral antimicrobials, which was mainly through the water supply. This meant there had to be a considerable investment of time and effort to ensure that the industry was prepared for the ban on in-feed medications by 2011. Feed companies, as well as vets and the Government, were involved in providing technical support on how drinking water solutions could be used on farm. This required technical communication of three main areas:

- Technique (pumps, etc.)
- System (water piping)
- Drinking water quality

These areas, plus the selection of alternatives to antibiotics, were also a responsibility of the veterinarian in charge of the farm. Local vets were instrumental in supporting their clients in the move away from medicated feed. Heavy users in particular were targeted with appropriate advice on how to minimise antibiotic use.

While the approach to replacing in-feed medications included short-term solutions, such as drinking water, top dressing has also been used as an alternative (short-term) approach, which has more significant potential risks to the development of antimicrobial resistance than commercially produced medicated feeds. The position to allow top dressing by the Dutch industry has been one which recognises it as being 'poor practice' but also its use as a temporary measure. This is to allow industry to reach the longer-term goals of improving biosecurity, management and the use of alternatives as a way of reducing the risk of disease.

The feed industry is exploring the use of alternatives to in-feed medications; however, the quality of these products varies considerably. Some alternatives, for instance feed acidification, have a reasonable body of evidence to suggest a potential benefit. Unfortunately, there is still a number of products which, rather than being proven for efficacy, fall under the heading of being of debatable therapeutic use, or just plain quackery. Despite the potential for alternative products to be used, it is still, ultimately, the use of good management, hygiene and identifying the route of infection, which are the key to success.

7.0. The visit to a Dutch pig farm

The tour group travelled a short distance from the conference venue to a pig farm, to see how the principles outlined in the morning's talks were being implemented on farm. This provided an excellent opportunity to discuss with the producers how they had been affected by the new legislation and what measures had been adopted to maintain production and to mitigate any losses in productivity on farm.

7.1. The basic profile of the farm

The site visited was an 1100-sow unit,run as a farrow-to-wean farm using a continuous farrowing system. The farm was arranged over two sites, the main site was seen on the tour and the other site was used for gilts and some weaners. The farm weaned piglets at 21 days of age and held a pre-weaning mortality of around 11%. The weaners were sold from the farm once they had reached 25 kilograms and these were, in the main, exported to Germany.

The sows were sourced externally, with the farm buying them in. Litter sizes were, on average, around 15 piglets, however, the size ranged from around 11 to 20 per litter. The farm had a weaning rate of approximately 32 piglets per sow per year.

7.2. Health management

Clear demarcation between each of the 'zones' within the unit, providing a physical 'line of separation' prompting staff to observe the need to wash, change and disinfect between zones.

The farm had been designed with good biosecurity in mind. There was a clean, modern 'shower in, shower out' facility with the capacity for three people to shower simultaneously. Dedicated clothing was provided on the unit into which all personnel were expected to change. Sows were housed in fan ventilated sheds grouped into three biosecurity 'zones'. These zones were all colour-coded and staff were expected to change footwear, using a Danish entry style wash booth, when moving between each area which related to farrowing sows, weaners and dry sows. This biosecurity also followed into the farrowing house with dedicated disposable overshoes at each side of the farrowing pen. These overshoes had to be used by any staff wishing to enter the pen to handle the piglets, to reduce the chances of introducing new pathogens into the nursery pens.

After farrowing, piglets were kept as much as possible within birth litters through the weaning phase. Changes to these groupings were only made to even out group sizes, or if ill pigs needed to be removed, with any that were removed placed in a hospital pen together. Group sizes did show some variance, with some of the groups being smaller (ranging from 9-10 weaners) and others comprising up to 15 weaners. The piglets and weaners were being vaccinated for several different diseases which, in the main, were required by the German importer. Mycoplasma and circovirus were both vaccinated for, but were not present on the farm but they also vaccinated for PRRS, which was present. In addition to vaccinations which were required, the piglets were also vaccinated for *Streptococcus suis* using the ST9 subunit vaccine as there was a problem with it on the farm, however, it did not cover ST2 infections.

'Zoning' of areas within the unit was one of the methods being employed to minimise the risk of pathogen spread and contributed to the 'marginal' gains approach seen on farm

7.3. Piglet management

The piglets were commonly cross-suckled to help distribute the larger litters between the same farrowing groups. Colostrum management was also seen as being a key to producing piglets which were able to resist disease and help to reduce the antibiotic usage. This meant there was a requirement for close observation and management of litters to ensure that all piglets were able to suckle.

Good piglet nutrition was also regarded as a key management tool to reduce susceptibility to infection. The farm provided wet feeding to the piglets (milk solution available from day one) then progressed to a liquid vegetable protein from week two. There was an ongoing problem with scouring in the second week post-weaning. Measures to prevent this were in the form of a creep feed for the piglets to prepare the gut, followed by reduced feed intake in early weaning. This reduction was then coupled with an increase in the fibre content of the diet, to allow adaptation of the flora to the sudden escalation of feed intake in the post-weaning period.

7.4. Management of personnel

Staff on the farm were all Dutch which was considered to be a key part of the success of the unit. This stemmed from the desire to have staff which were both skilled and motivated. It was outlined that the successful running of the farm required staff who were conscientious in their work and had a genuine interest in the welfare and wellbeing of the animals on the unit. Well-motivated staff can make the difference between success and failure in ensuring production targets are met in the face of the reduction targets for antimicrobials and other legislation applied to farming.

7.5. Environmental management

The environmental management was also an area which required consideration on the farm. The farm buildings were based around a slatted system, with fan assisted ventilation, which then exited through chimney stacks on the roof. On the tour there were some problems observed with ventilation where the stocking was insufficient to allow the stack effect to draw out enough air, resulting in raised ammonia levels, but this was isolated to one room on the whole farm.

The farm itself stood on approximately 17 hectares of land, but the majority of this land was leased out to an arable farmer. Therefore, manure management on the farm allowed for some of the manure produced from pig production to be spread, however, the majority of the faecal matter was handled by a commercial waste disposal company. The company charged approximately €15-16 per cubic metre to dispose of the waste, which contributed considerably to the outgoing expenses of the farm. This method of waste disposal is in line with the Dutch regulations on trace elements in manure, which recognise the discrepancy between the high quantities of animal waste produced versus the relatively small land mass within the country.

As well as contracting out waste management, the management of vermin on farm was performed by an external rodent control expert, who visited the farm every six weeks to check on the baiting and rodent levels. This contributed to another outgoing expense for the farm but regular visits also ensured a reduced number of rodents on farm, which could act as a vector for disease within the unit.

7.6. Innovation observed on the farm

In absentia of antimicrobial usage, there was a number of employed management methods or innovations seen on the farm which had been put in place to help maintain efficient production.

In the farrowing house, the unit was using a rise and fall hydraulic farrowing crate system, to reduce potential losses of piglets. While this technology has been developed for a while, it has not been widely adopted, partially due to the cost of installation. In this instance, a 'marginal gains' approach may be taken, where any preventable losses must be reviewed with more significance if reliance upon antimicrobials is removed as a factor.

This approach extended to the handling of piglets by staff, with the general objective being minimal handling and minimal stress to the piglet, wherever possible. Staff handling piglets from within the crates utilised a flexible board (similar to a rubber pig board) to decrease the pen size and allow quick treatment of the piglets when required. As previously mentioned, vaccinations were used as part of the health strategy, which were delivered via a needleless injection 'gun'. The 'gun' utilised less volume of product than a conventional injectable vaccination and was significantly quicker to administer. This method also eliminates potential for cross-contamination of pathogens between piglets via needle. On observation, it appeared that the piglets were much more comfortable following vaccination utilising a needleless system than when using the conventional method.

Another piece of equipment that was used to reduce piglet handling was a 'tagmatic' tagging bench. This trolley had the capacity to apply a button tag, thermocauterise the tail as well as oral coccidiocidal dosing and a needleless iron injection. The trolley was designed to allow staff to treat piglets quickly and perform several tasks in quick succession. The theory behind this approach was that all the treatments were performed as a 'single hit', minimising stress and recovery time from the process.

Two water lines were available with one dedicated to delivering medication. Valves within the housing allowed control of medication to the individual pen level.

Targeted treatments could also be provided to individual pens of sows, piglets or weaners through the water supply. As the Dutch have banned the use of in-feed antimicrobials, the use of in water oral medication predominates in pig production. The farm made use of a 'two-line' system which separated water and treatment lines. Valves provided the farm staff with the ability to switch between medicated water and unmedicated on a pen-by-pen basis.

While many of management practices in place may be found on units in the UK, it was clear that the adoption of these management strategies had, in some way, been influenced by the legislation reducing antimicrobial use on farm. 'Reduction by any means' is an approach the industry has been forced to take, and which, has resulted in the adoption of any technology or systems which may help achieve the targets set in place.

8.0. Conclusion

The Dutch approach to antimicrobial reduction is multifactorial, in order to achieve the targets set down by Government. It is important to note that the approach has been following a number of years where high levels of antimicrobials had been used routinely, which, following a series of public health scares, had galvanised Government into implementing restrictions on antimicrobial use in the livestock sector. The sector has responded to the challenges imposed upon it by Government and achieved the reduction targets which have been set. This couldn't have happened without a close collaboration between producers, government and allied industries to facilitate the changes being made. However, this process has driven a change to the structure of the industry, more in favour of larger commercial pig production enterprises. This is also reflected by changes in the allied and support industries, which have had to become more streamlined and focused to deliver the targets required by Government.

The decision to implement arbitrary reduction targets has some advantages, seen in the case of Holland, as the first few targets have been met easily by the industry. However, the 2014 reduction values may suggest a slowing down of the rate of reduction and it is reasonable to conclude that ability to further reduce antibiotic use may plateau once the 'easy wins' are achieved. Certainly there may be problems on the horizon with potential bottlenecks in reduction, such as problems with *E coli* as a pre-weaning infection, the prevalence of *Streptococcal* infections, levels of respiratory disease in finishers, as well as the difficulty in controlling conditions such as proliferative enteritis caused by *Lawsonia intracellularis*.

The visit to a Dutch farm demonstrated that a lot can be achieved on the road to antimicrobial stewardship and several factors could be managed by simple improvements on farm. The visit demonstrated that the total antimicrobial usage on farm could be reduced by making improvements in several factors: biosecurity, feed, staffing and vaccination. . It was clear that the engagement of the farm staff, allied industry and vets was vital to help achieve a more conservative use of antibiotics on farm. Investment in technology and innovation was used alongside making small management changes which, while they may appear to give only 'marginal production gains', were more significant when antimicrobials could not be used as freely.

There is also cause for some caution to be taken with this approach, as yet there is no qualification for the 70% reduction target for 2015 and whether it will be achievable by the industry. If significant production losses or increases in disease occurred, or welfare was compromised, there would need to be a serious review of the targets being set. Persistent bacterial diseases seen on farm may yet prove to be the limiting factor in what can be achieved and this has to be recognised by Government. There are also risks in taking the Dutch model and trying to implement it in other countries, as the Dutch had some of the highest levels of antimicrobial usage before these controls were set in place. Reductions in other countries are likely to be proportional to the starting value and would probably encounter the same limiting factors which may beset the Dutch in future.

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