OPPORTUNITIES TO IMPROVE THE WELFARE OF VEAL CALVES
BY REDUCING ANTIMICROBIAL USE

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Worldwide the veal industry is specialized in producing high quality meat, by fattening excess male calves from the dairy industry on a milk replacer diet with variable levels of roughage. Today veal production is heavily criticized because of using the largest amount of antimicrobials of all documented cattle businesses (N.B. the feedlot industry has not been documented yet). For example, in the Netherlands in the benchmark years 2009-2010, antimicrobial use was 6 animal daily doses (DDDvet/animal/year) in dairy cattle, whereas it was 34 DDDvet/animal/year in veal calves. This means that an average veal calf received enough antimicrobials to be treated for 34 days on an annual basis, or 17.9% of their lifetime. In Belgium the situation was even worse with 60 DDDvet/animal/year. This intensive antimicrobial use resulted in very high levels of antimicrobial resistance in commercial, pathogenic and zoonotic bacteria (e.g. methicillin resistant Staphylococcus aureus, extended spectrum beta-lactamase producing Enterobacteriaceae,…) from veal calves. Transporting and commingling of very young calves from multiple farms of origin (e.g. 1.3 calf pro herd of origin in Belgium) is inherent to the veal industry and results in a large infectious pressure and ditto disease burden. To tackle this problem, the veal industry relied on (predominantly oral) antimicrobial group treatments, which resulted in an acceptably low mortality (4.9% ± 0.8 in dairy veal calves). Today, such high levels of antimicrobial use are no longer tolerated in the European union and reduction is urgently needed. As a counter-argument against a too rapid reduction, the industry and veterinarians fear that mortality might increase if antimicrobial use decreases too much, too fast.

Historically the veal industry is very susceptible to criticism on animal welfare. To improve the situation, European laws on antimicrobial use, without risking welfare or economic issues, were introduced in the Netherlands and of 50% by 2020 in Belgium. Both countries prohibited preventive antimicrobial use and obliged benchmarking and antimicrobial susceptibility testing for critical antimicrobial use. Treatment guidelines (formularies) have been made available in both countries. In this lecture, an overview is provided on how the pressure to reduce antimicrobial use induced changes in the Belgian veal industry, which might have potential for improved welfare in the future. Methods used in a Flemish sensitization campaign towards the veal industry are presented.

Rational reduction in antimicrobial use and the ‘three pillar’ approach

In the context of antimicrobial use the term ‘rational use’ signifies only using based on reason and logic and optimal for all objectives, namely economics (production), welfare and public/environmental health. In essence, only animals with an evidenced bacterial infection should be treated with antimicrobials. Easily stated, but a very difficult objective to realize in herds with average sizes of 500 heads, high levels of viral circulation and strict economic limitations on the diagnostic budget available. To guide the veal industry towards a gradual reduction in antimicrobial use, without risking welfare or economic issues, a demonstration project commissioned by the Flemish government was conducted in 2014 in collaboration with the Flemish Animal Health Service (DGZ Vlaanderen). The knowledge base for this project was laid in a series of studies documenting morbidity, mortality and antimicrobial use in the Belgian veal industry and identifying the main pathogens. The selected communication strategy towards veal farmers, veterinarians and veal company owners consisted of three pillars (Figure 1). A first pillar held a series of calf selection parameters to assure minimal disease risk, and hence minimal antimicrobial use and production losses in the calves purchased. A second was dedicated to adequate housing and nutrition. The third pillar focused on antimicrobial therapy (prudent use).

First pillar: calf selection parameters

The aim is to only purchase animals with minimal disease risk. In a Canadian study for example, as much as 50% and 25% of calves arrived dehydrated and with an abnormal umbilicus or diarrhea. Healthy animals would be less likely to harbor any pathogen upon arrival, or allow massive pathogen replication upon infection. It is a well-known secret in the veal industry that clusters of mortality can occur within calves originating from the same herd. This fact is already used as economic leverage to reduce calf purchase prices. A second easily accessible param-
eter is a clinical examination upon arrival. A slightly enlarged umbilicus and severe dehydration were linked with increased mortality risk. Interestingly, antimicrobial use was lower in Swiss veal farms having an arrival examination of all calves done by the veterinarian. To what extend the disease history (previous treatments) of the calf can be linked with performance on the veal farm is currently unknown, but interesting to explore. Another promising technique is thoracic ultrasonography to select calves for purchase and targeted treatment upon arrival. Scanning upon arrival has found access to practice, but scientific evidence on its economic benefit is currently lacking. Selecting animals based on age remains controversial. Older calves have less risk for diarrhea, but conflicting study results exist. Thin calves are prone to disease, and calves weighing less than 51 kg have 2.7 times higher odds for hampered respiration, worsening with reducing weight.

Next to origin, general characteristics and clinical examination also additional blood parameters can be determined. Adequate colostrum uptake is essential to minimize disease risk and assure growth in the first months of life. There are indications that dairy and beef farmers provide less well colostrum to calves destined to the veal industry. In calves younger than one week cheap screening tests based on serum total protein (cut-off = 51 g/L) can be used upon arrival, despite a high prevalence of dehydration (12%) in these animals. In Europe, calves need to be two weeks old before they can be transported. At that age serum total protein can no longer be used, but gamma-globulin levels (cut-off = 7.5 g/L) as determined by electrophoresis or radial immune diffusion still can. Despite that the knowledge and possibilities to practically test the animals are available, systematic or targeted testing for failure of passive transfer is still not done in any major veal company in Belgium or the Netherlands. Recent studies showed that calves that had antibodies against bovine respiratory syncytial virus, parainfluenza virus type III and bovine coronavirus had reduced odds for respiratory disease in the first weeks after arrival. This observation is a plea for vaccination of dams or calves on the herds of origin. An additional blood parameter of interest to test in Holstein calves upon arrival and provides economic leverage to reduce/increase price of a poor/good quality calf. A financial compensation for better calves will stimulate the herds of origin to assure a good body weight, colostrum uptake and vaccination, improving calf welfare.

Second pillar: nutrition and housing

It is outside the scope of this lecture to go into great details on the role of nutrition and housing in immunity and disease. This paragraph is limited to informing the reader on what communications were made towards the veal industry, within the framework of the demonstration project to reduce antimicrobial use. Adequate nutrition has major effects on the functioning of the immune system and hence the animals ability to cope with the high infection pressure in veal facilities. Assuring adequate body condition creates better protection against cold stress (insulation) and more reserves to mount a prolonged acute phase response. Because of the closed nature of diet composition in the veal industry, communication on this topic was limited to assuring protein/caloric needs and sufficient levels of iron. To what considers housing, the main point of attention was adequate ventilation, protecting calves from cold stress and air pollutants. Stable ventilation audits with demonstration of ventilation patterns (smoke) were used to sensibilize the target group. Similarly, protocols for adequate cleaning and disinfection (including the milk pipes) were provided to the audience.

Third pillar: prudent and responsible antimicrobial use

It is evident that the most rapid reduction in antimicrobial use could be obtained by reflecting on one’s current practices. In figure 1 an overview of possible short term measures presented to the target group is provided, ranked according to feasibility. As in the Belgian veal industry, in the benchmark years 2009-2010 two antibiotics were used in 33% of the group treatments, 24% for undocumented indications (dysbiosis and nutritional diarrhea) and 13.0% as arrival prophylaxis: a massive opportunity to reduce.

Compliance and achieved results

Antimicrobial use data (2014-2016) from the largest veal practice in Belgium (295 production cycles from 78 farms) showed a 46% reduction in total antimicrobial use compared to 2010 (26.4 DDDvet/animal/year), and a 96% reduction in the use of critically important fluoroquinolones and 3rd and 4th generation cephalosporins. Use in the dairy veal industry is now almost similar in Belgium and the Netherlands. It is important to notice that this reduction was achieved before the Belgian law became active (voluntary change), in contrast to the Netherlands. Despite an overall reduction, major differences in antimicrobial use between veal companies still existed in Belgium, pointing towards the importance to sensibilize the company owners. No associations between a lower antimicrobial use and an increased mortality could be evidenced (Figure 2). In contrast, a positive association between antimicrobial use and mortality appears to be present in veal companies using less antimicrobials, whereas no relationship at all was observed in high use companies (Bokma et al., under revision). Mortality averaged 2.7% ± 1.3 (range: 0-7.0%) in these farms, the lowest number reported for any calf industry.
Positives could no longer be sold. This might in part explain the observed reduction in mortality in the veal industry, as about 0.6% of admitted calves was PI and these animals had low survival chances. Despite not yet being implemented systematically, interest on screening blood parameters, especially those related to colostrum uptake, has massively increased and some veil companies/veterinary practices plan to offer the service. Notice that vaccination was no part of the selected strategy. The reason was that at the time of the project insufficient evidence on the effect of vaccinating young animals after a stressor (transport and commingling) and at the time of pathogen exposure was available. However, indirect evidence towards dam vaccination or vaccination on farm is currently available. This vaccination strategy and many other calf selection parameters can only be achieved if dairy/beef producers and the veal industry connect better in the future. In the authors opinion a sustainable solution to truly prevent disease and reduce antimicrobial use is creating a mutual benefit situation, with higher prices for calves with minimal disease risk (vaccinated, adequate colostrum uptake and body weight,...). An important side-effect of the pressure to reduce antimicrobial use, was that several veterinary practices invested in software to automatize drug registration. As a consequence, the digital framework for effective disease registration at the individual level is currently available and offers the opportunity to monitor welfare as well.

Conclusions

The pressure to reduce antimicrobial use resulted in a rapid and massive decrease in Dutch (legislation) and Belgian (voluntary) veal calves, apparently without a worrisome increase in mortality. However, this reduction was mainly achieved by adopting current antimicrobial use practices, not by better disease prevention. It is unlikely that this reduced level of antimicrobial use will be accepted as an end-stage by the public opinion. Therefore, the real challenge for the industry has only begun, with investments in better calf quality at purchase (prevention) and individualized antimicrobial therapy as key elements for the future. The author recommends to all persons involved to kick-start the simultaneous benchmarking and evaluation of antimicrobial use and mortality as a very rough welfare indicator, to minimally assure that no animals are deliberately left untreated. The digital advancements made in this industry to automatize registration of antimicrobial use can easily be further extended for health and welfare parameters, preparing the veal and any other industry commingling young calves (dairy beef, dairy heifer rearing,...) to get the new ‘license to produce’ from the consumer, in full transparency.

References