# Demonstration of analysis on data collected under AACTING guidelines

www.virtualvet.eu | @VirtualVet_EU | mail@virtualvet.eu

July 2nd & 3rd 2019
AACTING Conference, Bern.

## THE CRUX OF THE MATTER

VirtualVet set about comparing the actual AMU on a randomised selection of three cohorts of cattle: 2019 born calves, 2015 born dairy cows and 2018 born beef cattle. The reason for treatment in each group was also analysed, with a view to establishing possible AMR present in repeated treatments to the same animal for the same reason.

We set out to demonstrate the advantages of the published Aacting guidelines, working to interpret each of the points set out in section 4, for ongoing deployment in real-world settings. Our business model has developed to serve the needs of industry and government. This has resulted in several monitoring objectives [4.1 (a)]; per herd for our farmers, per animal for processors, aggregated on a county/country level for monitoring and governing etc. For the analysis contributing to this paper, we have determined the industry requirements from our work reporting to agri-food processor. VirtualVet's farmer engagement team acts as the collection and quality assessment layer for each aspect of treatment data sent in for thousands of animals in near-real time, thereby fulfilling the role of "active control with respect to completeness and accuracy of the collected data [4.1 (f), (g), (h) & (i)]".

We have selected three sub-categories of bovines, from multiple sources captured on our portal [4.1 (b)] to get the AMU index as an indicator of 'mgs of Antibiotic Active Ingredient used per kg of animal mass' in food producing animals, using the weight-based and dose-based approaches as described in section 4.2(a) of the Aacting guidelines. Similarly, for 4.2(a) count-based approach, we will produce an index showing the 'number of days treated/ Year/Animal'. This can be compared to a similar index for average on aggregated animal data on City/County/Region, National and Global level, enabling more granular benchmarking of individual animals, possibly contributing to breeding decisions on-farm. The animal weight for the weight & dose-based calculation is selected for each sub-category using the PCU defined on the national standard [4.2 (b)].

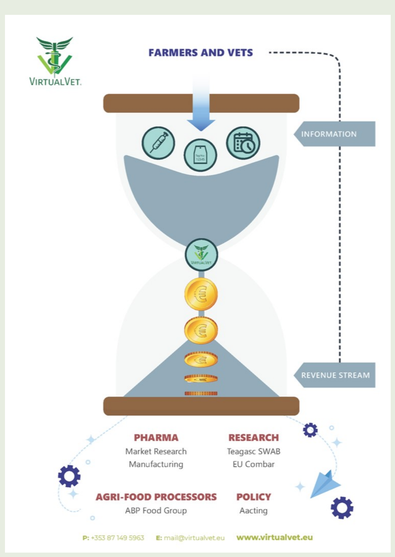
This work will lead to the creation of functions to generate AMU index(es) using the information captured by VirtualVet (animal date of birth, gender, breed, treatment duration, medicine, active ingredient, concentration, number of animals treated, total administered dosage and total sample size [4.1 (c) & (d)]) in a dynamic and responsive process.

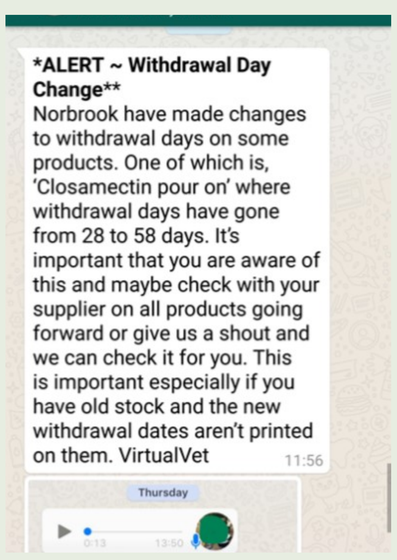
For example, the formula to generate the index showing 'mgs of Antibiotic Active Ingredient used per kg of animal mass' in food producing animals would be: $\sum_{i=1}^{n_{TE}} \frac{n_{Ai} \times C_i \times DDD_i \times n_T}{n_A \times PCU_s}$ which can be simplified to: $\frac{\sum_{i=1}^{n_{TE}} (n_{Ai} \times C_i \times DDD_i \times n_T)}{n_A \times PCU_s}$

*where $n_{TE}$: no. of treatment events; $n_{Ai}$: no. of animals treated in the treatment event $i$; $C_i$: Active Ingredient Concentration for the Antibiotic used in treatment event $i$ [mg/ml]; $DDD_i$: Defined Daily Dosage of the Antibiotic used in treatment event $i$ [ml]; $n_T$: Treatment Duration (in no. of days) for the treatment event $i$; $n_A$: no. of animals in the selected sub-set at the time of the treatment event; $PCU_S$: national defined PCU for the selected animal sub–set category [kg]*

## IMPLEMENTATION IN ACTION

The human in the loop—VirtualVet demonstrates the importance of direct communication with farmers and vets. We use their preferred method of contact to capture and digitise their antibiotic usage. This usage is logged to an individual animal ID, building an animal health profile for that animal, and then more broadly for the herd and farm.






VirtualVet employs various methods to communicate with its farmers: text messages, pictures, voice recording, email....

Our business model encourages all in the value chain to recognise the value of animal health data. The VirtualVet service can provide proactive warnings and information to reduce the risk of medicine residues entering the food chain. The information is curated and granular, enabling the calculation of multiple AMU indices as and when required.

## EXAMPLE

ANIMAL PROFILE

| | |
|---|---|
| Age | 6 yrs old |
| Breed | Friesian |
| Gender | Female |
| PCU | 425 kg |

Antimicrobial Usage Index for this animal from data recorded over 3 years:

***78.5 mg / kg***

## NO MORE EXCUSES

**Granularity & Accuracy =** $\frac{\sum_{i=1}^{n_{TE}} n_{Ai} \times C_i \times DDD_i \times n_T}{n_A \times PCU_s}$ **= Meaning & Context**

In our experience the AACTING guidelines offer the scope and clarity to enable improved on-farm data collection. The analysis of these data offer farmers and vets metrics trough which to plan interventions. Broader analysis of all of the farmers using the VirtualVet service shows a clear over use of critically important antibiotics, in some cases as much as 92% of the antibiotics used on a farm are critically important.

AACTING guidelines and improved measuring, monitoring and surveillance is necessary to drive any change in on-farm usage habits by both farmers and vets.