# Herd health management in dairy herds in Austria - Data integration with emphasis on antimicrobial use

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## Austrian Cattle Data Network

To enable efficient management and provide effective advice to dairy herd managers, a variety of different data sources often have to be combined to provide herd health-relevant information. In the electronic herd book of the Austrian Cattle Data Network, herd data, milk performance records, breeding records, as well as veterinary diagnoses, results of bacteriological milk cultures, and data on the administration and dispensing of veterinary drugs are recorded and can be accessed by the farmer and the treating veterinarian online via computer or mobile phone.

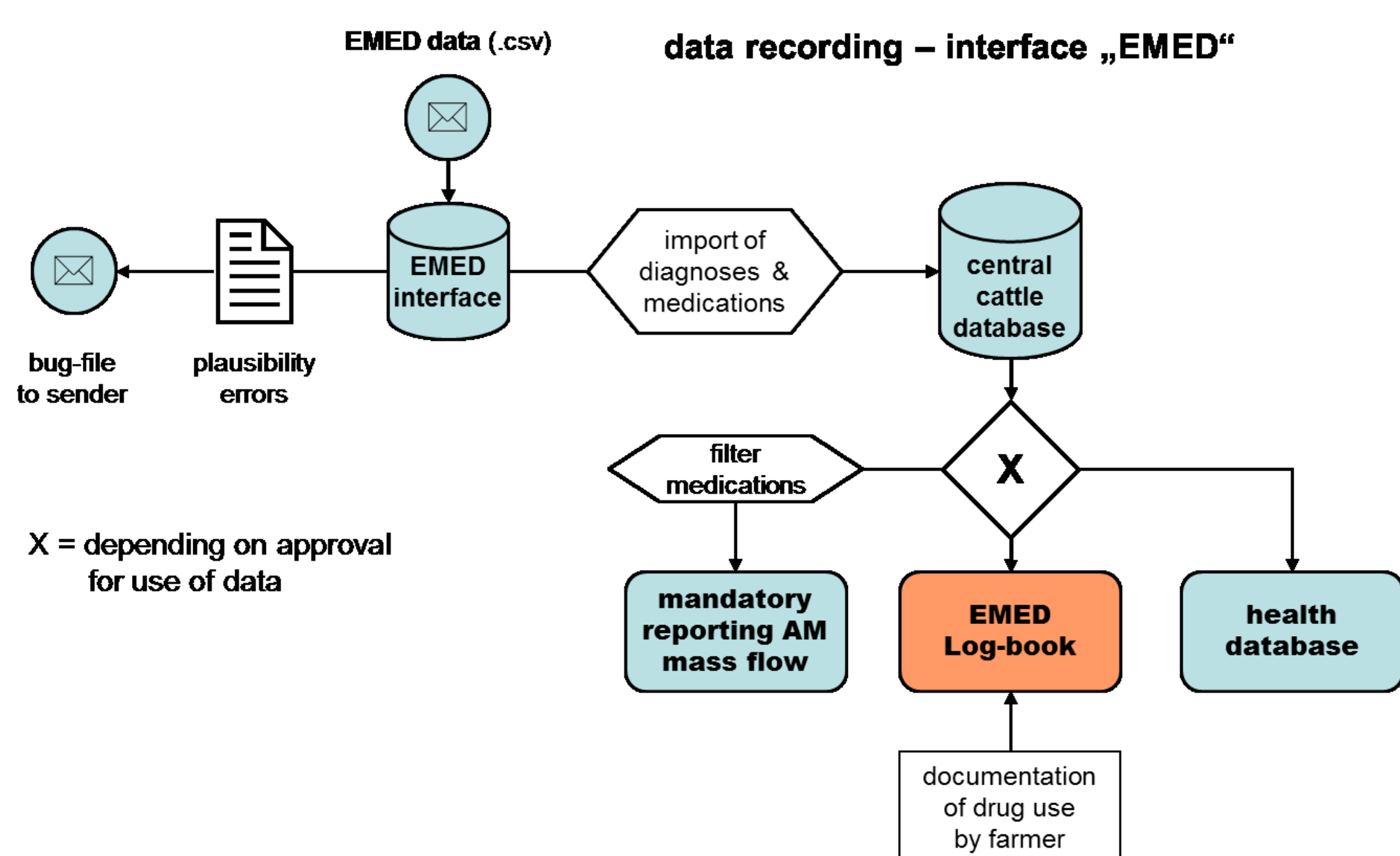## Electronic medication log-book (EMED)



Figure 1: Electronic medication log-book - data flowchart

The electronic medication log-book EMED is part of the electronic herd book app and provides a modern tool to document the use of veterinary medicinal products and enables efficient auditing of such medications (Figure 1).
Both the farmer and the herd veterinarian are able to fulfil their legal obligations via the online data transfer of information on the dispensing of veterinary medicinal products and the use of such medication to the central Cattle Data Network (Figure 2).
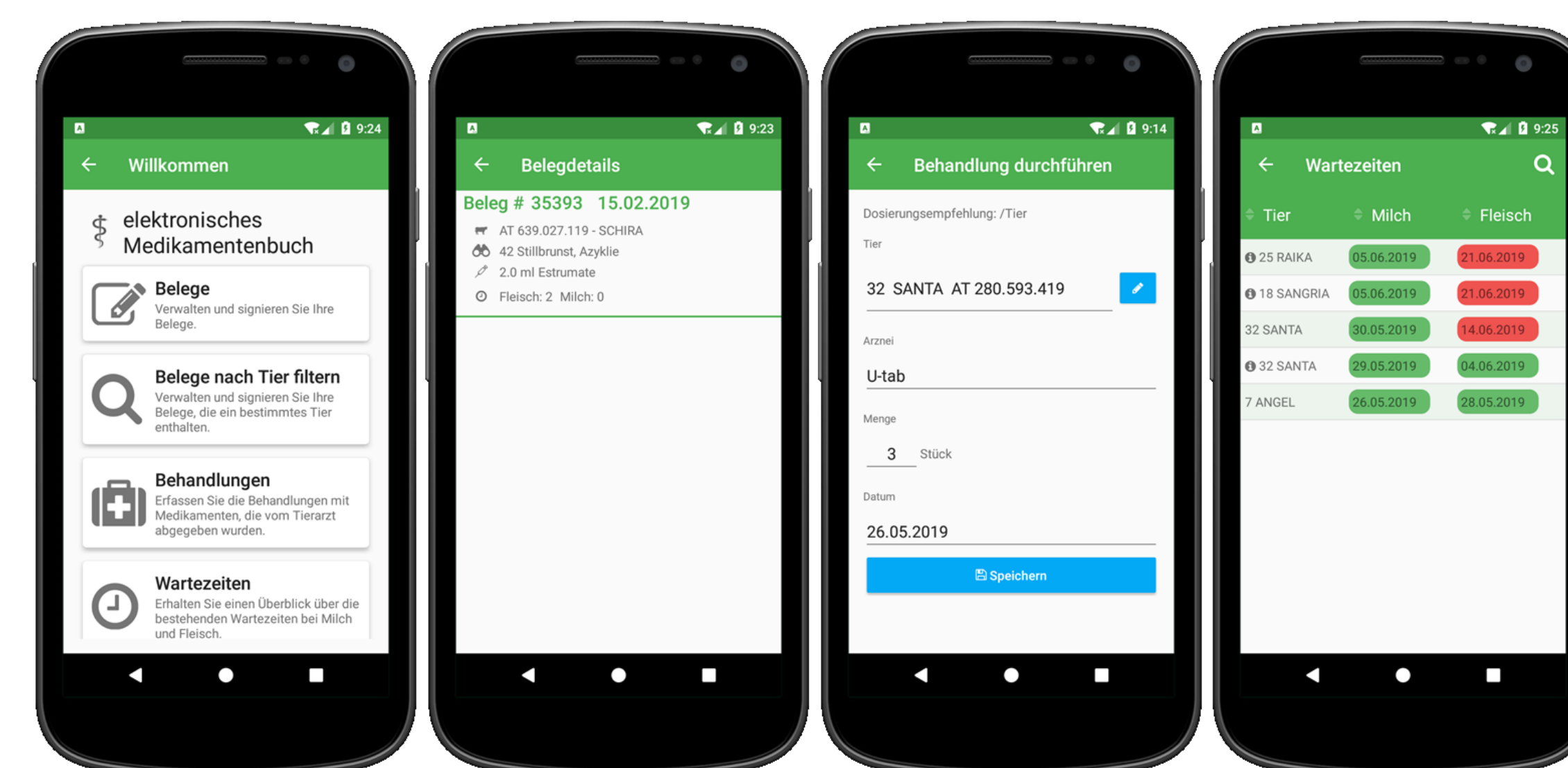


Figure 2: Electronic medication log- book – mobile phone application

## Herd-specific antimicrobial use

### Calculation of antimicrobial use

This electronic documentation allows for the calculation of metrics with respect to antimicrobial use. The number of treatment days over 365 production days per farm (TD365), based on the European Medicines Agency units of Defined Daily Doses (DDDvet) and Defined Course Doses (DCDvet, for dry-off preparations), is used as a metric to calculate antimicrobial use. The population-at-risk is all bovine animals (cows, calves, young-stock, any male animals) on farm during the observation period (Figure 3).

These metrics provide added value to the milk performance and herd health dataset. Individual herd-specific data can also be compared with metrics from other herds (benchmarking) (Figure 4).
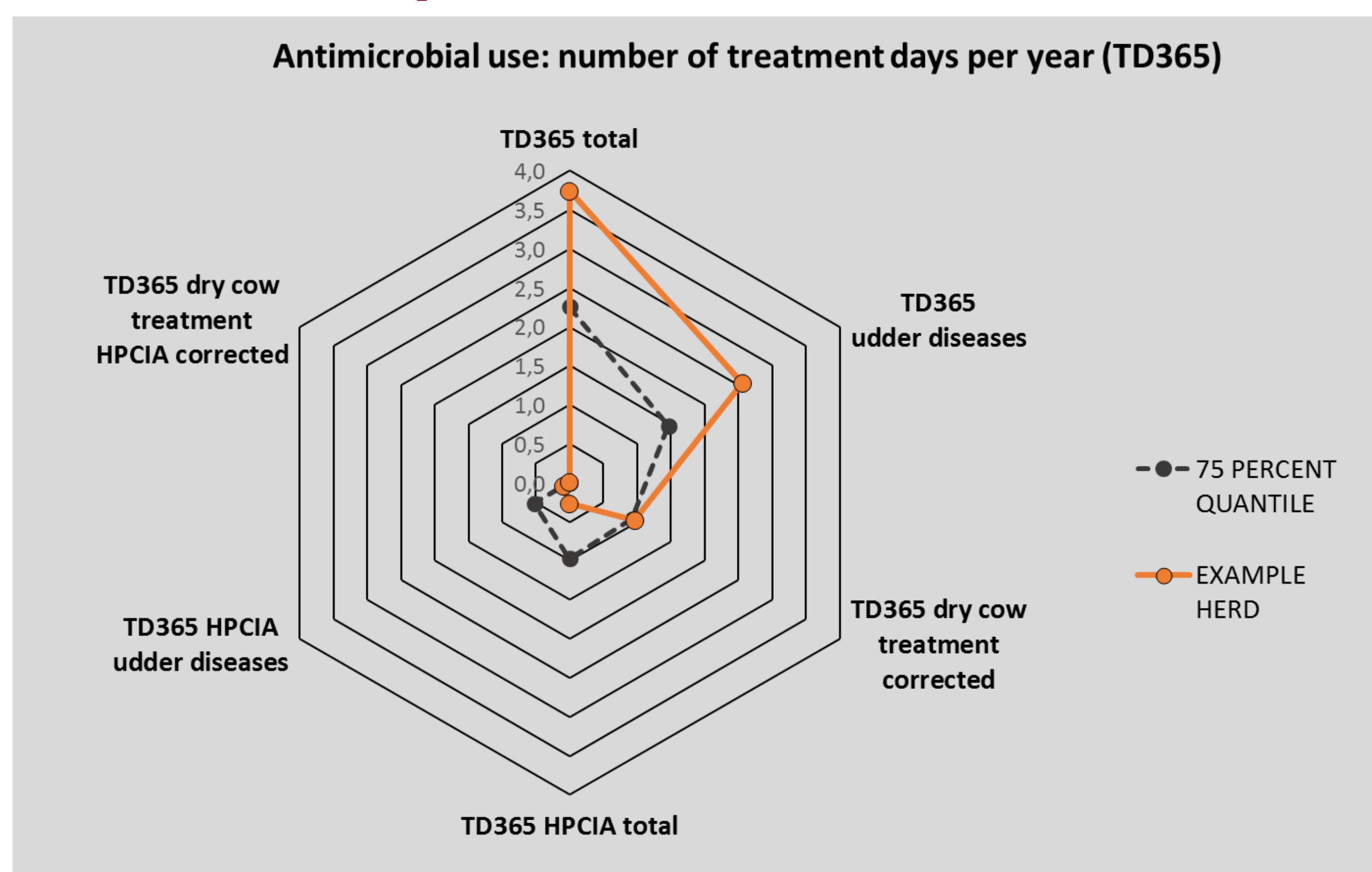


Figure 4: Antimicrobial use metrics – spider web diagram, exemplary presentation

### Observational study

Over a trial period of one year (Oct 2015-Sep 2016), data on antimicrobial use on 250 dairy farms (convenience sample) were collated as part of the research project, ADDA – Advancement of Dairying in Austria.

Antimicrobial use (excluding dry-cow therapy) in this study population ranged from 0 to 10.70 treatment days per animal and year, with a median TD365 of 1.20. While 75% of the farms administered less than 2.26 daily doses per animal and year, a small number of farms used up to four-times this level. Antibiotics were used most frequently to treat udder disease. Dry-off preparations were used in half of the cows in this study population (after adjusting for calving interval and replacement rate per farm). Antibiotics from the WHO-defined group of the Highest Priority Critically Important Antimicrobials (HPCIA) were used with a median TD365 of 0.39 (Table 1). Four out of five HPCIA doses administered were 3rd and 4th generation cephalosporins.



Calculation of the number of treatment days over 365 production days per farm ($\#TD365$):

$$\#TD365 = \sum_{i=1}^{n} \frac{amount\,AS_i\,in\,period\,P\,(mg)}{DDDvet_i\,(mg/kg/day)\,x\,\#production\,days\,in\,period\,P\,(days) \times standardised\,weight\,(kg)}\,x\,365$$

$\#TD365$ = number of treatment days per year that an animal is present on the farm
$amount\,AS_i$ = amount (in mg) of active substance i used in period P; i = 1, 2, …, n
$DDDvet_i$ = Defined Daily Dose of active substance i (in mg/kg/day); i = 1, 2, …, n (EMA 2016)
$\#\,production\,days\,in\,period\,P$ = number of animals present daily during period P (in days)
$standardised\,weight$ = standard animal weight at treatment (in kg)

Correction #TD365 for dry cow treatment:

$$\#TD365\,dry\,cow\,treatment\,corrected = \#TD365\,dry\,cow\,treatment * (CI/365 * (100/100 - PR))$$

$CI$ = calving interval of the herd (days)
$PR$ = percentage of cows replaced

Figure 3: Applied formulae to calculate metrics for antimicrobial use

|  | MIN | 25 % QUANTILE | MEAN | MEDIAN | 75 % QUANTILE | MAX |
|---|---|---|---|---|---|---|
| TD365 total | 0.00 | 0.58 | 1.69 | 1.20 | 2.26 | 10.70 |
| TD365 udder diseases | 0.00 | 0.25 | 1.10 | 0.65 | 1.46 | 10.01 |
| TD365 dry cow treatment (corrected) | 0.00 | 0.25 | 0.61 | 0.55 | 0.93 | 2.14 |
| TD365 HPCIA total | 0.00 | 0.15 | 0.78 | 0.39 | 0.98 | 9.81 |
| TD365 HPCIA udder diseases | 0.00 | 0.00 | 0.51 | 0.18 | 0.53 | 9.55 |
| TD365 HPCIA dry cow treatment (corrected) | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.68 |

Table 1: Antimicrobial use in dairy herds – results of the observational study

## Conclusion

The electronic medication log-book has been approved by the national authorities as fulfilling the Austrian legal requirements for the recording and documentation of drug use by farmers and veterinarians. The electronic medication log-book will be announced for use in dairy farms by the Austrian performance organisations from 2019 to 2020. Although the number of antimicrobial doses administered on Austrian dairy farms is already low, the calculation of metrics with respect to antimicrobial use should raise awareness for a more prudent use of antibiotics at herd level.

References: European Medicines Agency (EMA) (2016): Defined daily doses for animals (DDDvet) and defined course doses for animals (DCDvet)
World Health Organization (WHO) (2017): Critically important antimicrobials for human medicine – 5th rev.