# Cattle Health and Welfare Group Antimicrobial Usage Subgroup (CHAWG AMU) recommendations for measuring and comparing the use of antibiotics on UK beef farms

## Summary

An industry standard for measuring and monitoring antibiotic use on UK beef farms has been agreed following extensive industry consultation by the Cattle Health and Welfare Group's (CHAWG) Antimicrobial Usage (AMU) Subgroup. The new recommendations complement those for monitoring antibiotic use on dairy and sheep farms.

The CHAWG AMU group recommends that the following core metric is calculated for benchmarking beef farms, for both total usage and overall usage of Highest Priority Critically Important Antibiotics (HP-CIAs), as defined as category B by the Antimicrobial Advice Ad Hoc Expert Group (AMEG), i.e. quinolones (including fluoroquinolones), 3rd and 4th generation cephalosporins and colistin[1]:

- Core metric = mg/ kg$^{beef\ farm}$

The following additional (non-core) metrics are also discussed as they can provide additional value for internal management and benchmarking purposes:

- Youngstock metric = mg/ kg$^{beef<6months}$
- Animal based metric one = % Animals Treated
- Animal based metric two = Treatment Days

## 1. Responsible Antibiotic Use

Antibiotics are very important medicines. Every time an antibiotic is used, there is a risk that it will increase the number of bacteria resistant to that antibiotic. This means that these antibiotics will stop becoming effective for treating infections in people and animals. Responsible antibiotic use, alongside measures to prevent disease, is therefore vital to help preserve these life-saving medicines.

Some antibiotics are also very important as a last resort for use in the treatment of serious infections in people. These are called Highest Priority Critically Important Antibiotics (HP-CIAs). The HP-CIAs, as currently defined within category B by the Antimicrobial Advice Expert Group (AMEG)[1], are quinolones (including fluoroquinolones), 3rd and 4th generation cephalosporins and colistin. It is very important to minimise how much of these HP-CIAs are used on farms and only use them when needed, for example when bacterial culture and sensitivity show it is the only antibiotic that is effective to treat a particular case.

Beef farmers and vets should work together to monitor the amount of antibiotic used on farm every year and ensure that antibiotics are used responsibly. This is now part of the Red Tractor standards for beef farms[2].

## 2. Benchmarking Antibiotic Use

Farm benchmarking refers to the comparison of a farm's antibiotic usage with that of other farms in the region/country. This has several benefits:

- It allows farms to understand their antibiotic use and how this is changing over time and relative to the industry
- It stimulates the vet-farmer conversation and should encourage persistently high using farms to look into their management practices and make changes

When interpreting benchmarking data, it is vital to focus on encouraging responsible antibiotic use. Herd health planning and strategies to prevent disease are key to reducing the need to administer antibiotics and improving health and welfare on the farm. Reducing use by, for example, withholding necessary treatment, using lower than recommended doses or switching to an inappropriate antibiotic because it has a lower amount of active ingredient per dose is not responsible use.

The CHAWG AMU group have carried out an open consultation with a wide range of beef industry stakeholders to develop core metrics for benchmarking antibiotic use on UK beef farms. This document reports on the chosen core metric, which will be incorporated into the Medicines Hub for Cattle and Sheep, as well as additional metrics that could be considered. This does not, however, exclude the calculation of further antibiotic usage metrics, according to individual requirements and needs.

While systems are in place for the national monitoring of beef herds, for example using the Population Correction Unit (PCU) method developed by the European Surveillance for Veterinary Antimicrobial Consumption (ESVAC) group[3], it is not possible to use these for benchmarking at farm level as, for the beef sector, they are focused on measuring the number of slaughter animals. In the UK, many beef farms do not produce slaughter animals, or they produce so few that this number does not fairly represent their production system.

In this report, we will assume that there is full access to a National Traceability Database which makes it possible to automatically collect accurate animal number data (including number, age, sex and dairy/beef sire) and assess time on farm without having to ask the farmer for this information. This will increase the accuracy of the result obtained. However, where this is not the case, an alternative methodology (which relies on information that the farmer can more easily provide) is presented in Appendix One.

Given the wide variety of beef production systems, it is not possible to create a "perfect" metric that covers all possible systems. The aim is therefore to create one that provides a sensible balance between accuracy and pragmatism and works for the majority of farms. The metrics presented here rely on assumptions relating to standardised liveweights on farm which may not reflect the actual situation on each farm, but this is necessary because, while some farms may be able to easily provide this information, not all beef farms weigh their cattle or, if they do, record this information in a way that cannot be easily shared. The values created by such metrics should therefore be considered "technical units" rather than true values and need to be interpreted carefully by the farm's veterinary surgeon on a case by case basis, considering specific factors on each individual farm.

CHAWG AMU recommend a 12-month recording period is used for benchmarking, based on a calendar year or rolling year to date figure.

# 3. Core Metric

## 3.1. Core Metric – mg/ $kg^{beef\ farm}$ for both total use and use of HP-CIA's

These are calculated as follows:

### a) *mg = the total weight of antibiotic active ingredient used:*

Every antibiotic product contains a known amount of active ingredient. This is part of its registration with the Veterinary Medicines Directorate (VMD) and is centrally recorded. By measuring the number of units used on a farm in each recording period (e.g. calendar year or rolling 12-month recording period) then it is possible to calculate the weight of active ingredient in milligrams (mg):

| Antibiotic product | Amount used (A) | Concentration mg/unit (C) | Total antibiotic used in mg (A x C) |
|---|---|---|---|
| Duphapen | 600 ml | 300 mg/ml | 180000 |
| Alamycin | 1000 ml | 100 mg/ml | 100000 |
| Trimacare Boluses | 42 items | 1200 mg/item | 50400 |
| Terramycin Powder | 1000 g | 50 mg/g | 50000 |
| Nuflor | 200 ml | 300 mg/ml | 60000 |
| Total amount of antibiotic used (mg) | | | 440400 |

The amount of antibiotic used can be collected from records of the antibiotics supplied/ prescribed to a farm, for example from the veterinary practice, and/or records of actual use, for example from a farm medicine record book.

The recommendations are intended to be applicable irrespective of the source of antibiotic usage data. However, caution should be exercised when comparing data from different sources as they may differ. For example:

- Veterinary practice data on antibiotics purchased by the farm has a number of limitations. For example:
    - It does not take into account possible wastage or products going out of date
    - A product purchased one year may be used in the next usage year (although in some systems this is taken account of)
    - A farm may purchase antibiotics from more than one source, for example if a farm has more than one veterinary practice looking after its animals and/or purchases medicines from a different supplier under prescription
    - For mixed enterprises, for example with beef, dairy and/or sheep, it may be difficult to determine in which species or enterprise a product has been used

- Farmer derived data overcomes the issues highlighted above, but relies on accurate and diligent recording of all medicines administered and this may be variable between farms

When recording medicine use it is important that it is linked to a standard product name and Vm number (also called a Marketing Authorisation or MA number) and that it is recorded in (or can be converted into) a standard unit, i.e. ml, grams or items (where an item refers to, for example, a single bolus tablet or intramammary tube).

When calculating the weight of active ingredient used, the recommendation is to follow the methodology set out by ESVAC, which currently includes all antibiotics except topical antibiotics such as eye drops and sprays[4].

A medicine list showing all currently licensed medicines for all species (alongside the standard Vm number and name) can be found here - https://www.vmd.defra.gov.uk/ProductInformationDatabase/.

A cattle and sheep specific spreadsheet, showing all currently licensed cattle and sheep medicines (as well as medicines which expired in the last 24 months and those known to be commonly used under the cascade) and, for all non-topical antibiotics, standard units and the amount of active ingredient per unit in mg/unit (using ESVAC principles) can be found here – https://www.vmd.defra.gov.uk/productinformationdatabase/downloads/CattleSheepProductData.xml.

### b) $kg^{beef\ farm}$ = *the average total liveweight of animal population on the farm (in kg):*

It is important that the weight of antibiotic used (in mg) is interpreted relative to the total weight of animal population on the farm during the recording period (in kg) to create a mg/kg metric.

In this case $kg^{beef\ farm}$ relates to the liveweight of animals on the farm. This is different to the PCU methodology for beef farms used for national reporting, which uses standard weights that represent the "average weight at time of treatment". Liveweight was chosen in this case, as it can be estimated for different categories of animals using available liveweight/ carcass weight data, whereas data on the average weight at time of treatment for these different categories is not available.

In order to calculate this, the following standardised weights and animal categories should be used:

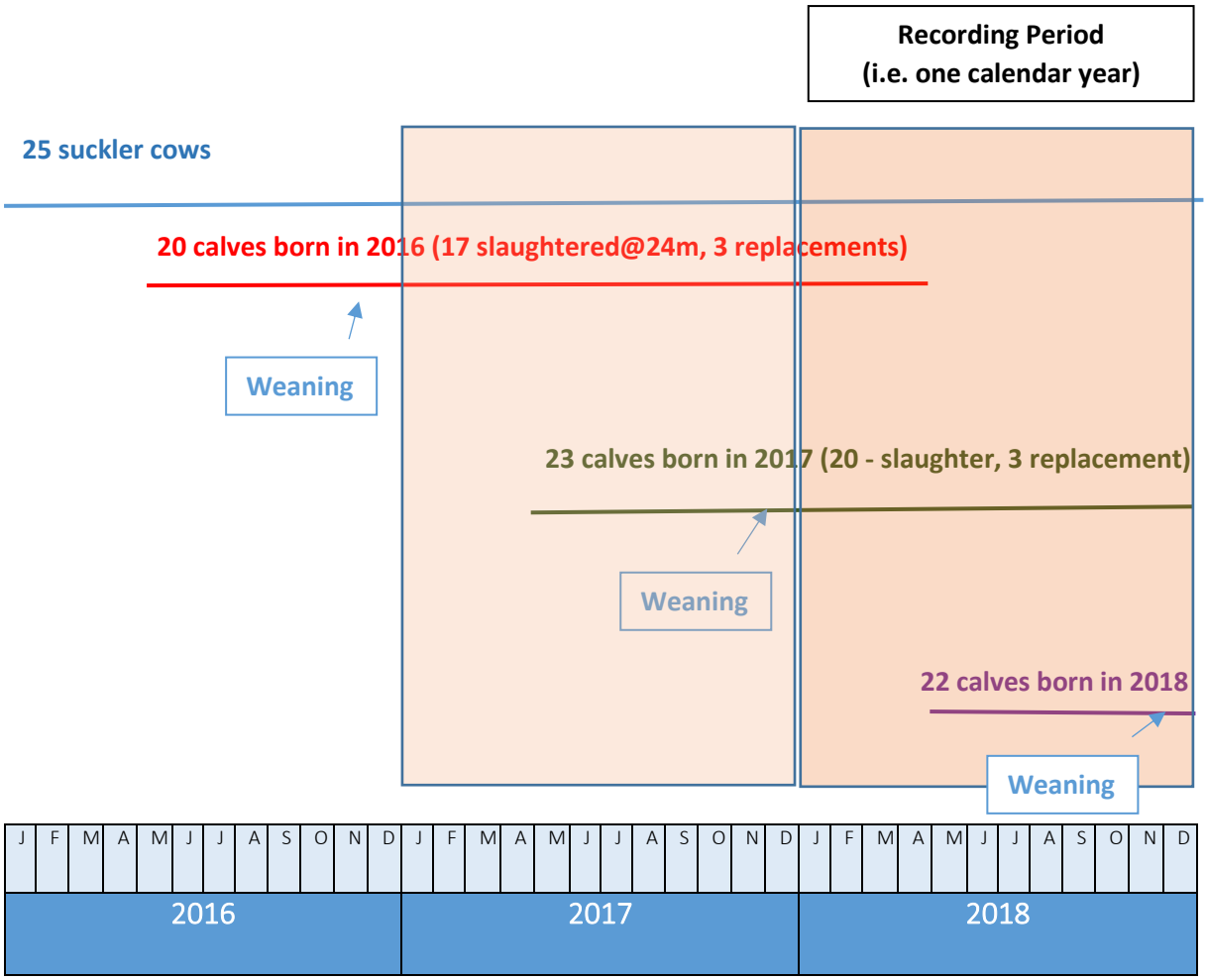
| | Dairy-sired female | Dairy-sired male | Beef-sired female | Beef-sired male |
|---|---|---|---|---|
| **<6m** | 108kg | 118kg | 112kg | 122kg |
| **6m - <12m** | 248kg | 283kg | 261kg | 278kg |
| **12m - <18m** | 389kg | 434kg | 417kg | 445kg |
| **18m - <24m** | 530kg | 572kg | 568kg | 600kg |
| **≥24m** | 640kg | 780kg | 670kg | 850kg |

Using these standard weights:

- The denominator for each category can be calculated by multiplying the "average number of animals" within each category by the standard weight
- The average number of animals per category is ideally calculated by taking the number of cattle type on farm in each category from a national traceability database every day of a calendar year, or rolling 12-month reporting period, adding these together and dividing by 365. However, as a minimum, it is recommended that the number of cattle on the farm in each category is assessed once per month (and then in this case added together and divided by 12 to get the average number per category)

The cattle breeds which are considered dairy have been included in the Supplementary Materials. All other breeds should be considered beef. Assuming access to a national traceability database, this process will be automated and not require any input from the farmer. If this is not the case, then an alternative methodology is presented in Appendix One.

We will use an example of a spring calving suckler herd that put 25 cows to the bull in 2018 and had 20 calves born in 2016, 23 calves born in 2017 and 22 calves born in 2018. Every year, 3 calves were kept as replacements (put to the bull at 19 months) and the rest were sent for slaughter (at 24 months). This can be mapped out as follows:




In this case, the kg weight of animals at risk on the farm would be automatically calculated as follows:

| | Beef-sired females (average number - n) | Standard weight (kg) | Category weight at risk (n *kg) | Beef-sired males (average number - n) | Standard weight (kg) | Category weight at risk (n *kg) |
|---|---|---|---|---|---|---|
| <6m | 5.5 | 112 | 616 | 5.5 | 122 | 671 |
| 6-<12m | 5.8 | 261 | 1514 | 5.5 | 278 | 1529 |
| 12-<18m | 6 | 417 | 2502 | 5.5 | 445 | 2448 |
| 18-<24m | 5.3 | 568 | 3010 | 5.1 | 600 | 3060 |
| >24m | 25 | 670 | 16750 | 1 | 850 | 850 |
| TOTAL (kg) | **48** | | **24392** | **23** | | **8558** |

Therefore the total $\mathbf{kg}^{\text{beef farm}}$ = 24392kg + 8558kg = 32950kg

### c) *Calculation of mg/kg$^{beef\ farm}$:*

**mg/kg$^{beef\ farm}$** is calculated by dividing:

- The total weight of antibiotic used on the farm (in mg) by
- The total weight of animals at risk on the beef farm (in kg)

If we use the figures described in sections 3a and 3b then we get the following:

- $\text{mg/kg}^{\text{beef farm}} = \frac{440400\text{mg}}{32950\text{kg}} = 13.4$

An additional case example from a calf rearer unit is included in section 5 of the Supplementary Materials.

CHAWG AMU consider that mg/kg metrics which assess the weight of active ingredient are valuable as:

- They are used for national monitoring and for benchmarking in other sectors, including pigs and dairy
- They can be calculated using both supply/prescription data (e.g. from veterinary practice records) and farm-derived data
- There is often good correlation with dose-based metrics. For example, in a study looking at a convenience sample of 207 commercial sheep only farms in England, Wales and Scotland from 8 veterinary practices, an 84% correlation between a mg/kg-based metric and daily dose metric was found[5]

However, CHAWG AMU accept that there are some disadvantages, including:

- The amount of active ingredient per course can be lower for some antibiotics than others. This is particularly the case for HP-CIAs such as fluoroquinolones, colistin and 3rd and 4th generation cephalosporins. This has led to a concern that a mg/kg-based metric may drive farmers towards using these antibiotics. However, in the beef sector the use of HP-CIAs is relatively low (1% active ingredient administered in a 2018 sample[6]) and, to avoid driving inappropriate behaviour, it is recommended that a mg/kg$^{beef\ farm}$ for HP-CIA's is calculated and monitored separately alongside a total figure
- Some non-HP-CIA products (e.g. trimethoprim-sulphonamides, which have two active ingredients) can have a higher amount of active ingredient than others, but may be the responsible choice in a particular case
- Weight-based metrics don't always reflect the number of animals treated. For example, the weight of antibiotic given to a calf will usually be less than the weight given to an adult cow. Therefore, antibiotic usage in calves can be relatively hidden in a farm level mg/kg metric.

# 4) Additional Metrics:

In addition to the Core metric described in section 3, there are a number of additional (non-core) benchmarking metrics which can provide additional context and guidance to stewardship activities. These do not replace the core metric and it is important to note that all antibiotics used on the farm should still be included in calculation of the core metric.

## 4.1. Youngstock metric - mg/kg$^{beef<6months}$ for total use and use of HP-CIAs:

It is recognized that antibiotic use in calves is an important issue on some farms. However, due to the smaller weight of calves relative to weight of the adults, especially those under 6 months of age, their antibiotic use can be hidden in farm "mg/kg" metrics relative to the use in larger adult cattle. In addition, industry feedback suggests that high use in youngstock doesn't necessarily mean high use in adults and vice versa.

It is therefore considered that, where possible, there is value in capturing youngstock antibiotic use separately, alongside the overall farm-level figure for internal management and benchmarking. This data can also be compared to other data, such as vaccine usage and mortality, which is invaluable in helping feed into the vet-farmer discussion, health planning and responsible antibiotic use.

In order to do this, we can use a similar "mg/kg" methodology described earlier but with the following differences in the calculation of a mg/kg$^{beef<6months}$ metric:

### a) *mg $^{beef<6months}$ – weight of active ingredient for calves under 6 months of age*

In order to determine usage in calves <6months of age, it is necessary to know the volume of medicines which have been used in these calves (as opposed to the cattle which are 6 months of age and over).

If using farm data, this can be achieved by the farmer assigning medicine use (e.g. on an electronic medicine book) to:

- an individual animal ID
- a particular age-group or animal/ group of animals, for example by choosing on a drop-down menu "<6months" or "≥ 6 months" of age

If using vet prescription/ delivery data, this can either be achieved by:

- Assigning at the point of sale that the medicine is being prescribed to be used in cattle "<6months" or "≥ 6 months" of age (this is the preferred method)

- Retrospectively looking at the vet data and assigning particular products (or volumes of products) to cattle "<6months" or "≥6 months" of age

If we use the example in 2a), and assume that the following were used in cattle <6 months of age:

| Antibiotic product | Amount used (A) | Concentration mg/unit (C) | Total antibiotic used in mg (A x C) |
|---|---|---|---|
| Duphapen | 50 ml | 300 mg/ml | 15000 |
| Trimacare Boluses | 42 boluses | 1200 mg/bolus | 50400 |
| Terramycin Powder | 1 kg | 50000 mg/kg | 50000 |
| Total amount of antibiotic used (mg) | | | **115400** |

Therefore, in this farm, out of the total use (440400mg), 26% (115400mg) was used on cattle <6 months of age.

### b) *$kg^{beef<6months}$ – average liveweight of beef cattle<6 months of age on the farm (in kg):*

This can be calculated by using a similar process described earlier and collecting the "average number of animals <6 months of age" using the categories and weights identified earlier. It we use the example from 3b then you get the following:

| | Beef-sired females (average number – n) | Standard weight (kg) | Category weight at risk (n *kg) | Beef-sired males (average number - n) | Standard weight (kg) | Category weight at risk (n *kg) |
|---|---|---|---|---|---|---|
| <6m | 5.5 | 112 | 616 | 5.5 | 122 | 671 |

Therefore, in this case $\mathbf{kg^{beef<6months}}$ = 616kg + 671kg = 1287kg.

### c) *Calculation of $mg/kg^{beef<6months}$*

Based on the information above, a $\mathbf{mg/kg^{beef<6months}}$ can be calculated as follows:

- $\mathbf{mg/kg^{beef<6months}} = \frac{115400\text{mg}}{1287\text{kg}}$ = 90

## 4.2. Animal based metrics

Because of the limitations of weight-based metrics, where more detailed farm level data is available, CHAWG AMU also recommend that animal based metrics are considered for farm and youngstock monitoring, as well as for total use and use of HP-CIAs. These have a number of additional advantages as follows:

- Each animal is treated the same (e.g. calves and adults)
- There is no need to apply standard animal weights
- They can be more easily applied to non-antibiotics e.g. Non-Steroidal Anti-Inflammatory Drugs
- The figures may be more tangible and easier for the vet and farmer to understand and monitor progress

However, they are considered to be "non-core" as they require information to be obtained directly from the farm (for example using the farm's animal medicine records or electronic medicine records) and cannot be calculated using vet prescription/ delivery data.

### *4.2.1. % Animals Treated:*

For this calculation, you need to know the number of animals treated with an antibiotic over the 12 month recording period – which could be calculated using, for example, farm's animal medicine records or an electronic medicines book. Treated animals refers to any animal that has received one or more doses of antibiotic at any point in the recording period. There is no distinction made between an animal that has received one treatment course and one that has received multiple courses.

The number of treated animals during the recording period is then compared with the total number of animals that have been on the farm during the course of the calendar year, or rolling 12-month period, irrespective of how long they have spent on the farm. This can be obtained using a national traceability database:

$$\%\ \text{Animals Treated} = \frac{\text{number of animals treated with antibiotics}}{\text{total number of animals which have been on the farm}} * 100$$

If we consider the same example included earlier, the following would be calculated:

| Total number of animals on the farm (N) | Number of animals treated (T) | % animals treated T/N x 100 |
|---|---|---|
| 90 | 11 | 12% |

This means that 12% of the animals on the farm have been treated with an antibiotic in the recording period (2018).

### *4.2.2. % Treatment Days:*

This is an extension to the calculation in 4.2.1 but instead of looking at the number of animals treated, it looks at the number of days that an animal receives an antibiotic. This has the advantage in that it takes into account course length and repeat treatments for the same animal. However, it does require more detailed information on course lengths prescribed. In addition, if an animal is treated with a long-acting antibiotic, then the number of days treatment will need to be multiplied by the length of activity for that product. Please see section 4 of the Supplementary Material for information relating to the average duration of action for the currently licensed long acting active ingredients used in cattle.

The total number of treatment days is then compared with the average number of animals which have been at the farm during the recording period multiplied by 365, to create a figure that represents the average % of time that each animal has received an antibiotic treatment:

$$\%\ \text{Treatment Days} = 100 * \frac{\text{number of days animals were treated with antibiotics}}{\text{average number of animals which have been on the farm} * 365}$$

If we consider the example farm discussed, the following would be calculated:

| Average number of animals on the farm (N) | Number of treatment days (T) | Treatment days per animal (T/(N*365)) *100 |
|---|---|---|
| 71 | 28 | 0.1% |

This means that, on average, each animal was treated for 0.1% of the time.

## 5) Questions and answers

### *How have the standard weights been determined?*

The standard weights for each category have been calculated based on the average weight of animals within each category, using the following standard weights (in kg):

| | Dairy-sired female | Dairy-sired male | Beef-sired female | Beef-sired male |
|---|---|---|---|---|
| Birth | 38 | 45 | 42 | 50 |
| 6 months | 177 | 191 | 182 | 194 |
| 12 months | 318 | 375 | 4339 | 362 |
| 18 months | 459 | 494 | 496 | 529 |
| 24 months | 600 | 650 | 640 | 672 |
| Over 2 years | 640 | 780 | 670 | 850 |

These weights represent an estimated average of all cattle in that category, which includes cattle bred for breeding and slaughter across all different breeds. Multiple sources were used when making this judgement including internal AHDB data, annual carcase weight records, the AHDB dairy reference heifer management guide and BRP calf rearing manual.

### *How is the average number of animals within each category calculated?*

The number of animals within each category will vary over the year, especially in seasonal herds. It is therefore recommended that the number is measured at specific time-points. The ideal would be an average daily count using national traceability data (and then add these together and divide by 365 to get the average number), but for the mg/kg$^{\text{beef farm}}$ core metric, at least once per month is the recommended minimum for assessing the number of cattle within each category (and then adding these together and, in this case, dividing by 12 to get the average number).

### *Do we need so many categories, e.g. there is not that much difference in weights between dairy and beef-sired cattle and males and females?*

CHAWG AMU decided to have different weights for beef/dairy sire and male/female cattle, as this information is easily available using a National Traceability Database and the calculation will take place "behind the scenes" without needing to ask the farmer to supply the data directly. If a link to a National Traceability Database is not available, then it is recommended to use the simplified metric described in Appendix One.

### *Won't the average weight vary by breed?*

Yes, liveweight varies both within and between breeds. It was felt that introducing different weights by breed would be complicated, especially as many cattle are cross-breeds. The weights therefore represent an average weight across all breeds. The standard weights are best regarded as 'technical units' and this should be considered carefully when comparing the figures, particularly between farms with very diverse breed types.

### *For the additional youngstock metric, why was 6 months chosen as a cut-off?*

Feedback from the industry suggested that calves less than 6 months of age are in general the highest risk category in terms of getting diseases such as diarrhoea and pneumonia. However, because of their small size, use on these calves can be hidden in a farm mg/kg figure to a greater extent than use in cattle greater than 6 months of age. 6 months also represents the time when dairy origin beef calves tend to leave a calf rearing unit and when suckler calves become weaned, so it often represents a clear management change. CHAWG AMU considered adding an additional "pre-weaned" category for dairy origin beef calves. However, it was felt that asking farmers to split usage data into too many categories could provide added burden and could risk reducing the accuracy of the data obtained. In addition, it was thought that having multiple different youngstock metrics (e.g. pre-weaning, weaning to 6 months, 6 months to 12 months) could cause confusion.

### *Why do we need to measure total use and HP-CIA use?*

Because of the risks of cross-resistance and co-resistance (i.e. the use of one antibiotic class can induce resistance to another antibiotic class), reducing overall use of antibiotics is important in minimising the risk of the development of antimicrobial resistance.

However, there is particular scrutiny on reducing antibiotics that are considered highest priority for human medicine (as defined as category B by the European Medicines Agency), so categorised if they are used as a last resort antibiotic for serious infections in people and the risk of resistance transfer is considered high.

### *Why is it recommended to have a 12-month (rather than a 3- or 6-month) benchmarking period?*

A 12-month period (either based on calendar year or rolling year to date figure) is recommended as it considers seasonal fluctuations, for example due to climate as well as management systems (e.g. Spring- and Autumn-calving herds). However, the systems described in this paper could be easily adapted to cover a 3- or 6-month period.

### *Should farms separate usage by enterprise type (e.g. if they have a suckler and calf rearing enterprise or a combined dairy and beef enterprise)?*

The $mg/kg^{beef\ farm}$ metric represents total antibiotic use for beef on the farm (including adults and calves), and $mg/kg^{beef<6months}$ represents use on all beef calves <6months of age. It is therefore not necessary to separate usage between different beef enterprises, although if a farm has very distinct beef enterprises (e.g. a Suckler herd and a dairy-origin calf rearing unit) then it would be beneficial to do so, as it would allow these distinct enterprises to benchmark with other similar enterprise types.

For farms which are combined dairy and beef enterprises, it is recommended to separate out usage for dairy (e.g. adult dairy cows and replacement calves/heifers) and beef usage data in order to calculate the dairy specific core metrics described in the dairy benchmarking document.

### *What about beef farms that also rear other livestock, particularly sheep?*

CHAWG AMU recognizes that there are many farms that have multiple species, in particular cattle and sheep. In order to understand antimicrobial use by species, both on a farm and national level, it is important that the vet and farm are able to record which species the antimicrobial is being prescribed for/ used on. If this is not done, antibiotic usage on these farms may appear high when compared with beef farms that do not rear sheep. The Sheep Health & Welfare Antibiotics Working Group have produced metrics for benchmarking antibiotic use on sheep farms, and these can be found here - http://beefandlamb.ahdb.org.uk/returns/health-and-welfare/sheep-health-and-welfare-group-shawg/.

### *Why are topical products excluded?*

Topical products (such as antibiotic sprays and eye drops) account for a small proportion of antibiotic active ingredient used in beef farms and removing them is in line with ESVAC methodology.

### Are products used topically under the cascade (e.g. products licensed for oral use in another species but used topically within an antibiotic footbath) included in any of the analyses?

Yes, the amount of active ingredient in oral and injectable products used under the cascade should be captured in the mg/kg calculations.

### Which metrics should a specialist dairy heifer rearer use?

Where farmers are rearing dairy heifer replacements as a specialist enterprise, these cattle should be considered as growing/finishing cattle and use the metrics described in this document.

### Isn't it confusing that the benchmarking weights and categories are different to the PCU weights and categories so these are not directly comparable?

The PCU could not be used for farm benchmarking as it relies on slaughter animals, and may beef farms do not produce slaughter animals. The mg/kg$^{\text{beef farm}}$ metrics includes more animal categories and is based on liveweight (as opposed to the PCU which is based on "average weight at time of treatment"). It will produce a lower figure than mg/PCU and therefore the farm benchmarking metrics therefore cannot be directly compared with the national mg/PCU for beef. However, CHAWG AMU do not consider this to be a problem as the purpose, i.e. for trend monitoring and benchmarking, is different.

### Won't it confuse the farmer is the mg/kg$^{beef<6months}$ figure is higher than the mg/kg$^{beef\ farm}$ figure?

Yes, it is possible that the figure for youngstock will be higher than the total beef farm use (or it could be lower). The farm and youngstock benchmarking metrics ultimately tell you different things, and are intended to be used primarily for trend monitoring and benchmarking rather than being compared directly.

## References


1 - Advice on impacts of using antimicrobials - https://www.ema.europa.eu/en/documents/report/infographic-categorisation-antibiotics-use-animals-prudent-responsible-use_en.pdf

2 - https://assurance.redtractor.org.uk/contentfiles/Farmers-6912.pdf?_=636585117784901746

3 - Understanding the mg/PCU calculation used for antibiotic monitoring in food producing animals, https://www.gov.uk/government/publications/understanding-the-mgpcu-calculation-used-for-antibiotic-monitoring-in-food-producing-animals

4 – European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) - https://www.ema.europa.eu/en/veterinary-regulatory/overview/antimicrobial-resistance/european-surveillance-veterinary-antimicrobial-consumption-esvac

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8 – UK-VARSS Report 2018 - https://www.gov.uk/government/publications/veterinary-antimicrobial-resistance-and-sales-surveillance-2018

# Appendix One – Alternative mg/kg$^{beef\ farm}$ metric where there is no access to a National Traceability Database

If there is no access to a national traceability database, then getting information needed to calculate the average number of animals within a category is difficult to obtain. For this reason, a simplified way of calculating the weight of animal at risk (**kg**$^{beef\ farm}$) has been created, which relies on information that a farmer can more easily provide.

Standardised weights are then assigned for each category completed. As with the previous metric, these are based on the average liveweight within that category of animal but are adjusted to take into account the time that these group of animals spend on the farm (including on the years when they do not leave the farm). These "time on farm" estimates are based on industry averages and so may not reflect the situation on each farm. Where possible, it is preferable to use the metric described in the main document, which uses a national traceability database to more accurately determine time on farm.

For further information about this metric, including how the weights were determined, a template for farmers to fill in and an additional case example relating to a calf rearer farm then please see sections 2,3 and 5 of the Cattle benchmarking supplementary material.

## Information provided by the farmer and adjusted standard weights

For this metric, the farmers are asked to provide the following information, usually relating to calendar year, and the numbers provided are multiplied by the adjusted standard weights indicated:

| Question | Adjusted Standard Weight |
|---|---|
| **Suckler Herd** | |
| Cows and heifers put to the bull and purchased in-calf heifers | 762kg* |
| Home-bred beef cattle sold for further feeding or breeding (not for slaughter). Age when leaving farm:<br>- <1year<br>- 1-1.5 years<br>- >1.5 years | <br><br>0kg<br>266kg<br>453kg |
| Home-bred beef cattle sold for slaughter. Age when leaving farm:<br>- <1year<br>- 1-1.5 years<br>- >1.5 years | <br>174kg<br>343kg<br>655kg |
| Calves born in the recording period and retained for breeding | 367kg |
| **Calf Rearing Enterprise (dairy or beef sired calves from the dairy herd born on farm or purchased to rear on milk for beef production)** | |
| Dairy-origin calves sold for further feeding or breeding (not for slaughter). Age when leaving farm: | |

| | |
|---|---|
| - <1year<br>- 1-1.5 years<br>- >1.5 years | 41kg<br>323kg<br>482kg |
| Dairy-origin calves sold for slaughter. Age when leaving farm:<br>- <1year<br>- 1-1.5 years<br>- >1.5 years | <br>91kg<br>413kg<br>680kg |
| Growing and Finishing (purchased weaned dairy or suckler bred cattle) | |
| Bought-in growing/ finishing cattle sold for further feeding or breeding (not for slaughter) and their age at purchase/ arrival on the farm? | |
| Age when leaving - <1year | 104kg |
| Age when leaving – 1-1.5 years<br>Age at purchase/arrival:<br><1 year<br>1-1.5 years | <br><br>250kg<br>144kg |
| Age when leaving - >1.5 years<br>Age at purchased/arrival:<br><1 year<br>1-1.5 years<br>>1.5 years | <br><br>428kg<br>204kg<br>146kg |
| Bought-in growing/ finishing cattle that were sold for slaughter and their age at purchase/ arrival on the farm? | |
| Age when leaving - <1year | 48kg |
| Age when leaving – 1-1.5 years<br>Age at purchase/arrival:<br>< 1 year<br>1-1.5 years | <br><br>325kg<br>177kg |
| Age when leaving - >1.5 years<br>Age at purchased/arrival:<br><1 year<br>1-1.5 years<br>>1.5 years | <br><br>627kg<br>403kg<br>199kg |

*This takes into account the weight of pre-weaned calves up to 7 months of age

If we use the example highlighted in 3b, the farmer would provide the following information:

| | Number (provided by farmer) N | Standard Weight - W | Category weight at risk (N*W) (in kg) |
|---|---|---|---|
| Cows and heifers put to the bull | 25 | 762kg | 19050kg |
| Calves born in the recording period and retained for breeding | 3 | 367kg | 1101kg |
| Home-bred beef cattle sold for slaughter at >1.5 years | 17 | 655kg | 11135kg |

In this case the total $kg^{beef\ farm}$ = 19050kg + 1101kg + 11135kg = 31286kg

If we assume the antibiotic data is as described in sections 3a and 3b then we get the following:

- $mg/kg^{beef\ farm} = \frac{440400mg}{31286kg}$ = 14.1