Reducing antimicrobial use: a practitioner experience

Julian Allen, Jenny Bellini

In late 2015, the farm team at Friars Moor Livestock Health made a decision to improve responsible antimicrobial use on their dairy farms. In this article, Julian Allen and Jenny Bellini discuss their experiences of trying to reduce antimicrobial use.

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THERE is a drive to reduce the amount of antimicrobials used on farm to try to tackle the rise of antimicrobial resistance (AMR) worldwide. In their position statement on AMR, the British Cattle Veterinary Association recommends reducing the overall amount of antibiotics used in cattle practice, particularly use of the third- and fourth-generation cephalosporins, fluoroquinolones and colistin. Additionally, the association recommends that prophylactic use of antibiotics is to be avoided wherever possible, without compromising animal welfare. Meanwhile, the British Veterinary Association's overall aspiration is to reduce the use of antibiotics in animals and does not support the habitual use of prophylactic antibiotics.

For our farm team at Friars Moor Livestock Health, making the decision to improve responsible antimicrobial use was motivated by the following:

- We were increasingly aware of concerns about AMR raised in the veterinary press and general media, and we wanted to do the 'right' thing and move towards more responsible use.
- Farmers were beginning to ask about antimicrobial use and AMR, particularly those with certain supermarket contracts. Additionally, some of our vets attended meetings on AMR with milk buyers, where concerns about antimicrobial use were raised.
- Constructive discussions with neighbouring practices highlighted the need for change.
- Younger, more recently educated vets often had different prescribing habits compared to older colleagues. We wanted to ensure consistent use of antimicrobials across the practice.

Preparation for the campaign

During discussions at a series of clinical meetings, the whole farm vet team agreed to work towards significantly reducing the use of critically important antimicrobials (CIAs), namely fluoroquinolones and the third- and fourth-generation cephalosporins, over a 12-month period. If successful, the eventual target would be to make these products for 'vet only' use (ie, not to be dispensed to farmers) in exceptional circumstances (eg, when a culture and sensitivity result indicates that the organism isn't sensitive to any other class of antimicrobials). In addition, we decided to promote the use of selective dry cow

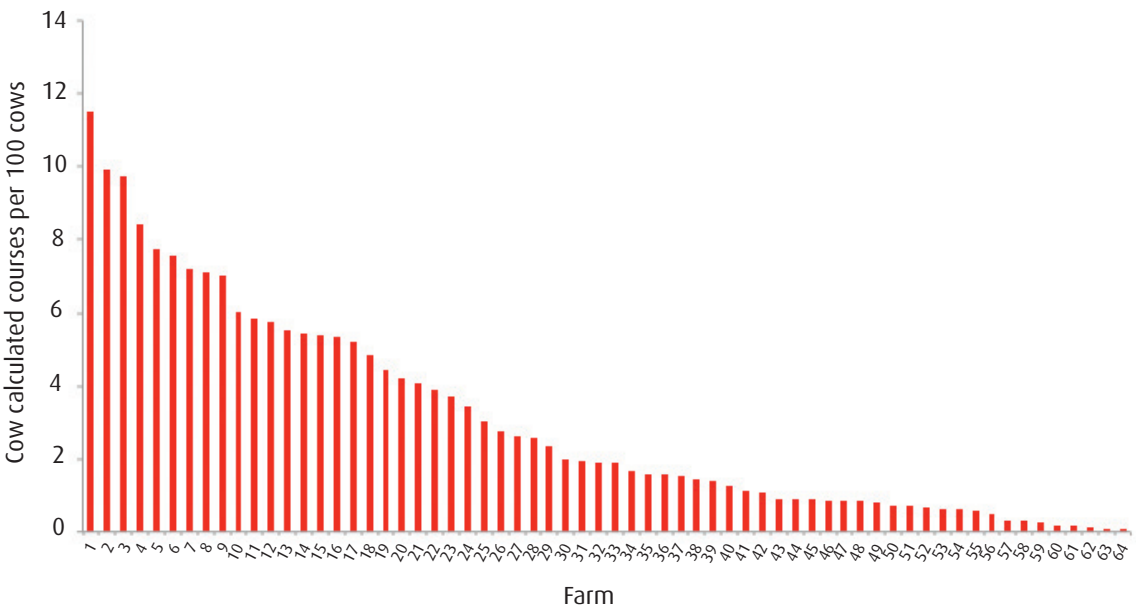

Fig 1: Sales data (June 2014 to June 2015) of cow calculated courses per 100 cows of marbocyl/marbox (13 ml per 650 kg cow given for three days). This data was used to benchmark critically important antimicrobial use across our clients' dairies

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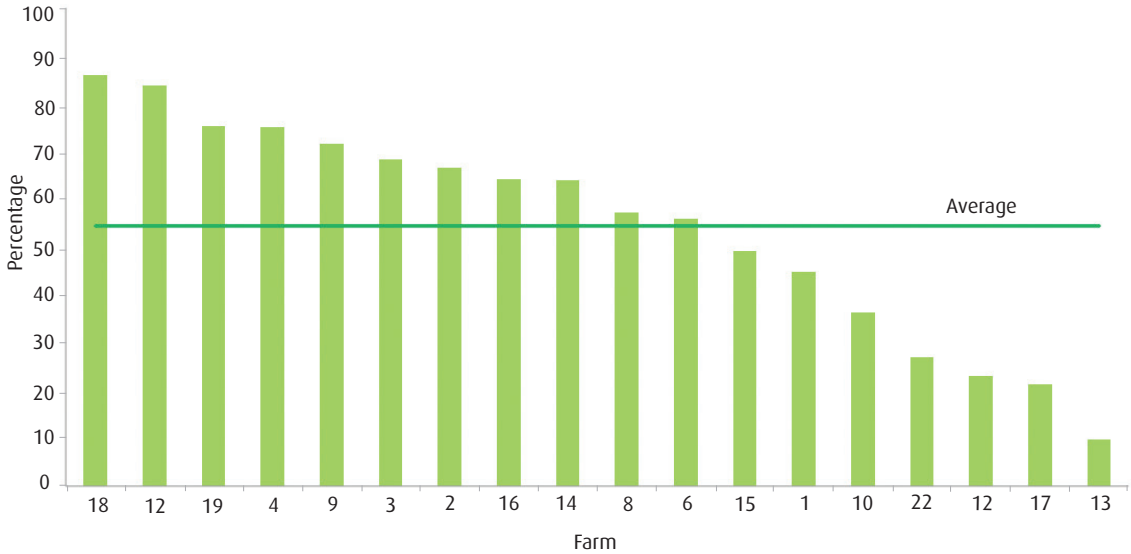


Fig 2: Percentage of cows receiving antibiotic dry cow therapy on high-yielding farms (May 2015 to April 2016)

therapy (SDCT) as a way of reducing overall antimicrobial use on our clients' dairy farms. We set about preparing our campaign as follows:

- We invited David Barrett and his team from the University of Bristol to a clinical meeting in which they described their experiences eliminating CIAs from their own university farm practice. This was extremely useful as it gave our whole team enthusiasm for the project and confidence that we might achieve our aims.
- We then used antimicrobial sales data to benchmark CIA use with cow calculated courses/100 cows across our dairies (Fig 1). This enabled us to target high CIA users and also to demonstrate to them that other farms, similar to their own, were achieving satisfactory results without using CIAs. Similarly, we analysed sales of dry cow tubes and teat sealants in preparation for conversations about SDCT (Fig 2).
- Treatment protocols offering alternatives to CIAs

Box 1: Alternative treatment protocols for conditions in which CIAs are commonly used

***Escherichia coli* mastitis treatment protocol**

- Fluids: pump with 40 to 50 l water and Off Feed (Aggers)
- Anti-inflammatories are key: give these until the cow is bright and eating well
- Do not give any antibiotic tubes: consult the vet
- Strip the milk out ± oxytocin
- Box rest the cows until they are eating, bright and well

To treat, use one anti-inflammatory and one antibiotic:

Drug Anti-inflammatories	Dose	Milk withhold
Metacam (Boehringer Ingelheim)	17 ml administered under the skin or intravenously every other day	Five days
Flunixin (Norbrook)	26 ml administered intramuscularly or intravenously every other day	24 hours

Drug Antibiotic	Dose	Milk withhold
Bimotrim (Bimeda)	33 ml administered intramuscularly or intravenously for three days	60 hours
Alamycin (Norbrook)	40 ml administered intramuscularly or intravenously, then 30 ml for two days	84 hours

Metritis/retained fetal membranes treatment protocol
To treat, use one anti-inflammatory and one antibiotic:

Drug Anti-inflammatories	Dose	Milk withhold
Metacam (Boehringer Ingelheim)	17 ml administered under the skin or intravenously every other day	Five days
Flunixin (Norbrook)	26 ml administered intramuscularly or intravenously every day	24 hours
Ketofen (Ceva Animal Health)	20 ml administered intramuscularly or intravenously every day	0 hours

Drug Antibiotic	Dose	Milk withhold
Betamox (Norbrook)	33 ml administered intramuscularly for three to five days	24 hours
Ceporex (MSD Animal Health)	25 ml administered intramuscularly for three to five days	0 hours

Table 1: Dry cow intramammary tubes

Name	Active ingredient	Spectrum of activity	Milk/meat withhold
Cepravin (MSD Animal Health)	Cephalonium (first generation cephalosporin)	Broad spectrum	Milk: 54 days + 96 hrs after calving Meat: 21 days
Ubro red (Boehringer Ingelheim)	Penethamate hydriodide, procaine penicillin, framycetin sulfate	Broad spectrum	Milk: 28 days + 84 hrs after calving Meat: 28 days
Bovaclox dry cow (MSD Animal Health)	Cloxacillin, ampicillin	Broad spectrum	Milk: 49 days + 156 hrs after calving Meat: 28 days
Bovaclox dry cow extra (MSD Animal Health)	Cloxacillin, ampicillin	Broad spectrum	Milk: 49 days + 156 hrs after calving Meat: 28 days
Multishield dry cow (Bimeda)	Penethamate hydriodide, procaine benzylpenicillin, neomycin sulfate	Broad spectrum	Milk: 50 days + 96 hrs after calving Meat: 28 days
Orbenin dry cow (Zoetis)	Cloxacillin	Gram positive (*Staphylococcus, Streptococcus*)	Milk: 30 days + 204 hrs after calving Meat: 28 days
Orbenin dry cow extra (Zoetis)	Cloxacillin	Gram positive (*Staphylococcus, Streptococcus*)	Milk: 42 days + 96 hrs after calving Meat: 28 days
Cephaguard dry cow** (Virbac)	Cefquinome (fourth-generation cephalosporin)	Broad spectrum	Milk: 35 days + 24 hrs after calving Meat: two days
Orbeseal (Zoetis)	Teat sealant only (ie, no antibiotic)		0 days

* Prices correct as of January 2016

** Using this drug should be discouraged. Please speak to your vet if you are using

were produced for key conditions in which CIAs were commonly used (Box 1).

- Lists detailing alternatives to intramammary tubes containing CIAs were produced and distributed to our vets to facilitate discussions with clients about changing dry cow therapy and treatment of clinical mastitis (Table 1).
- Before the campaign, a series of articles circulated in monthly newsletters to our clients drip-fed information on AMR and CIA alternatives to prepare them for face-to-face on-farm conversations with the vets.
- A series of case studies, which included cost benefit analysis, were presented in consecutive newsletters to our clients to describe in detail how three clients had successfully implemented SDCT on their farms.
- Farm receptionists, pharmacy staff, tuberculosis testers and vet technicians were all fully informed on the new protocols to ensure a whole team approach.

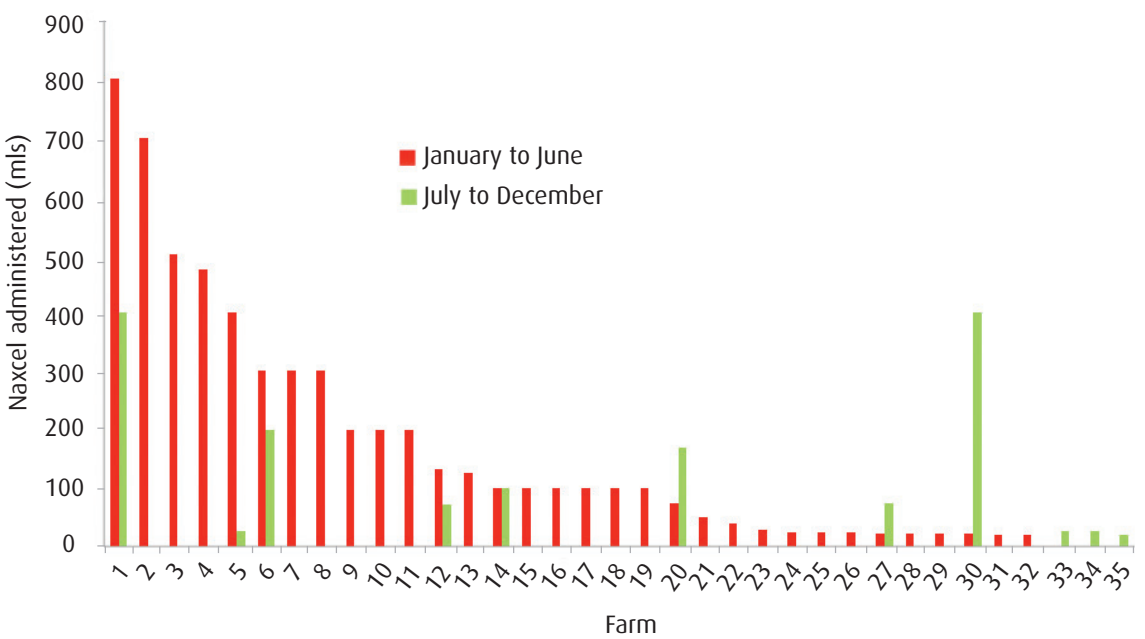


Fig 3: 2016 sales of Naxcel (Zoetis) on farms using the drug. The farms that had a peak in Naxcel use in the second half of the year were autumn block calvers, who therefore wouldn't use any Naxcel in the first half of the year

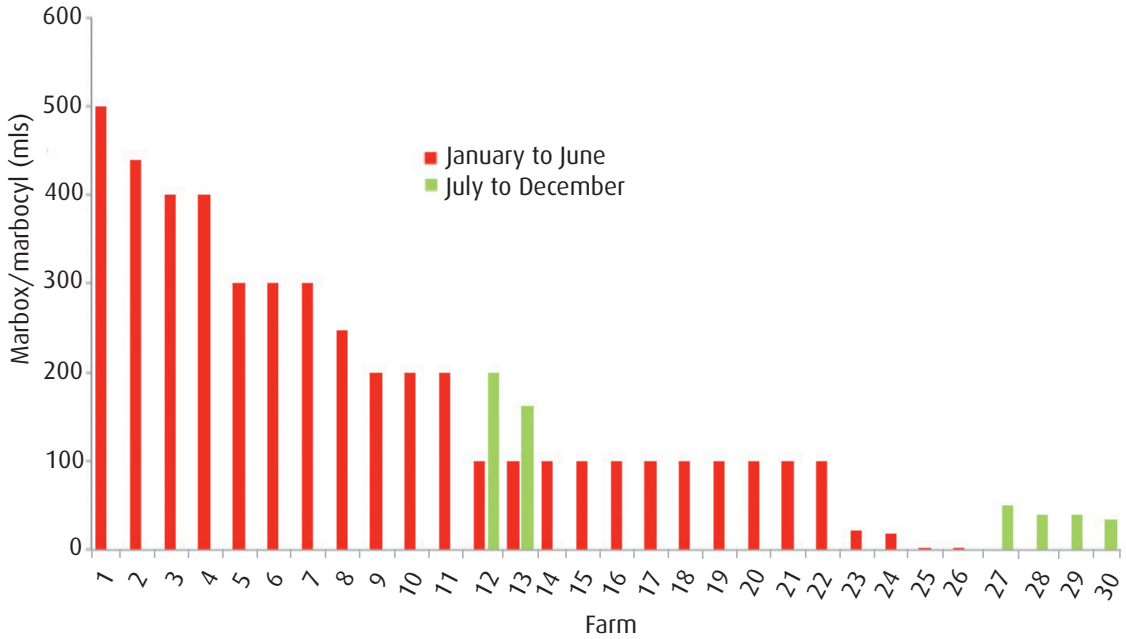


Fig 4: 2016 sales of marbox (Ceva Animal Health)/ marbocyl (Vetoquinol) on farms using these drugs. The peak in use on farms in the second half of the year was either due to the farms calving pattern or an indication that those farms needed revisiting and further encouragement to use an alternative drug

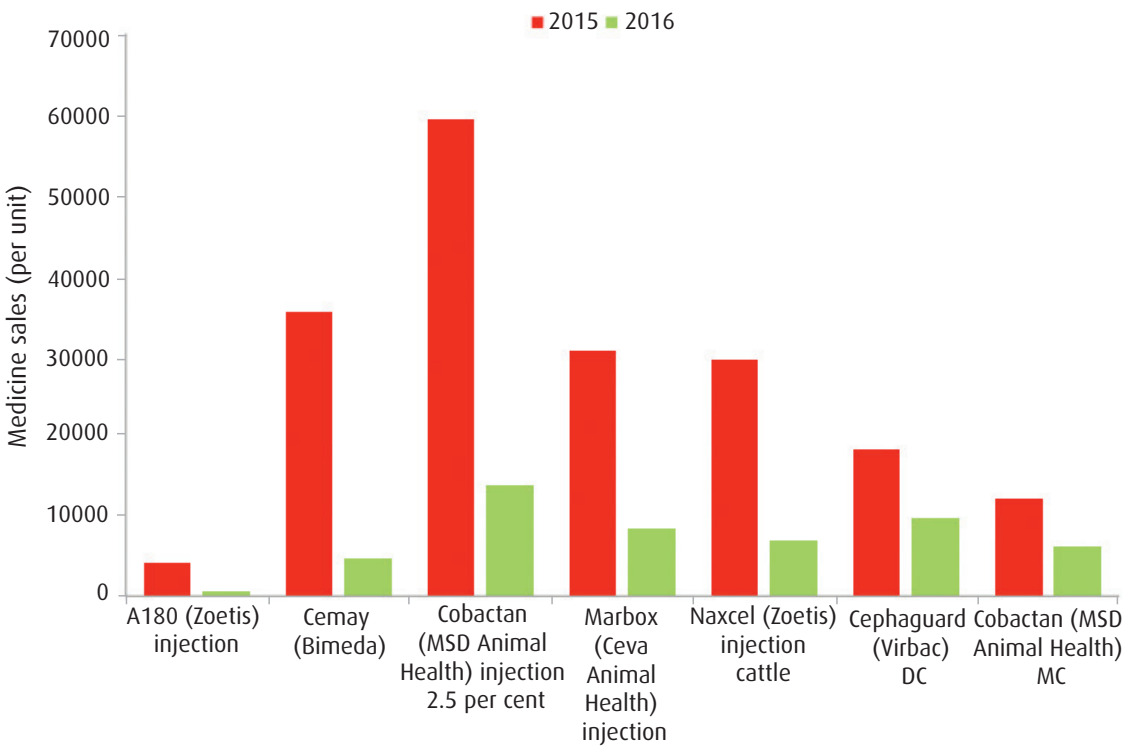


Fig 5: Comparing sales of critically important antimicrobials from 2015 and 2016 across all dairies

Implementation of the campaign

The campaign was implemented in early 2016. Each vet was given a list of target farms to engage with, using the tools and information described above. The way this was done depended on the farm and the people involved, but usually, following an initial conversation with the client, a meeting was set up to discuss the issues that had arisen from using the new protocols with all relevant members of the farm team.

We went for the easy wins first. These were normally the larger, more proactive farms and particularly those with milk contracts demanding some action to reduce CIA use. This gave us an opportunity to hone our technique and gain confidence to approach potentially more difficult clients or those using particularly high levels of CIAs.

At the outset, one of our main concerns was to avoid upsetting clients by refusing to dispense a CIA that they had previously been using. This was avoided by continuing to dispense in our usual way until the client had had an opportunity to discuss their use of CIAs with a vet. Our usual dispensing procedure is that clients will phone in a drug order and if the medicine requested is on a list of routinely used medicines authorised by a vet for that farm, then the pharmacy staff will dispense the drug. Otherwise the client must have a discussion with a vet first. Farm office staff quickly informed vets of any clients requesting CIAs and of any queries regarding antimicrobial use in general.

Discussion around responsible use of antimicrobials was included at every opportunity: during routine visits, at farmer benchmarking group meetings, training courses and health planning reviews. We also used posters,

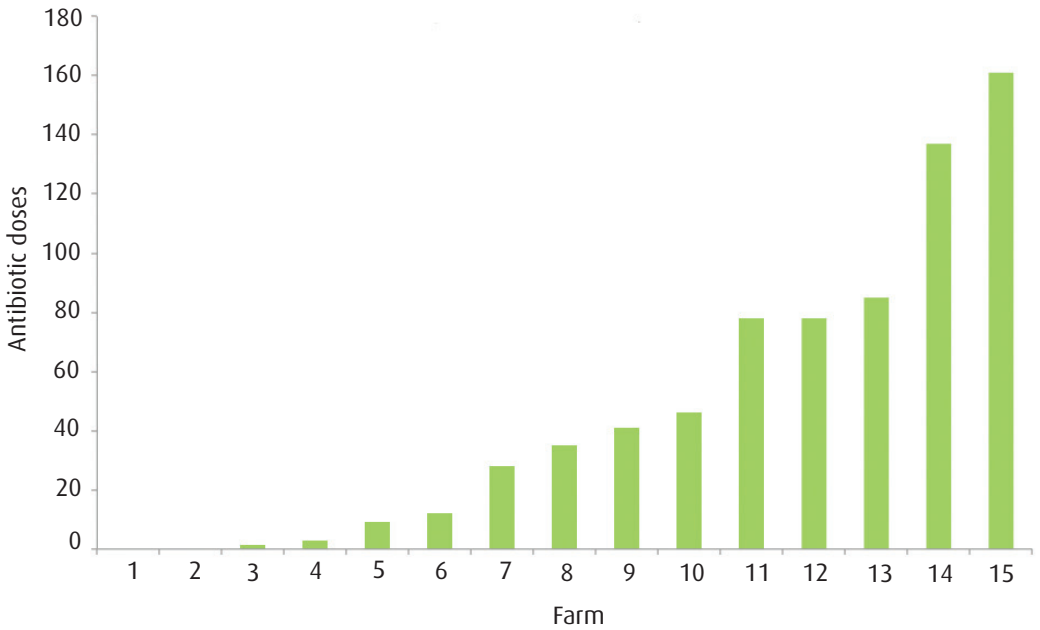


Fig 6: Total antibiotic doses for treatment of respiratory disease, diagnosed on 15 farms, per 100 calves born in 2015

newsletters and printed material in our farm reception to draw our clients' attention to responsible antimicrobial use.

In summary, we all used every opportunity to promote responsible antimicrobial use to our clients.

Results of our campaign

We monitored CIA sales during the year, comparing the first and second halves of 2016, and we saw that there were significant reductions in the use of all CIAs (Figs 3, 4, 5). At the time of writing, our pharmacy no longer contains any third- or fourth-generation cephalosporins or fluoroquinolones.

Clients quickly became aware of our campaign and have been remarkably accepting of the need to change their antimicrobial use habits, as have the vets. We have had very few difficult conversations with farmers who, on the whole, seem to be well aware of the significance of AMR to their businesses and society at large.

Farms often reduced treatment costs by replacing CIAs with cheaper generic antimicrobials, generating enthusiasm for change. Additionally, a large number of farms have started to implement SDCT. We are not yet aware of any instance in which the withdrawal of CIAs from a farm has significantly impeded the treatment of, or management of disease, giving the farm team a great sense of achievement.

During this past year, reducing antimicrobial use became a central pillar of all farmer meetings and training. Dry cow therapy, clinical mastitis, transition diseases and respiratory disease in youngstock were identified as key areas for antimicrobial use. All these subjects were discussed at meetings, where we used farm disease incidence data and medicine sales data to benchmark farm performance (Fig 6). A few clients have trialled on-farm culturing of milk samples with a view to reducing antimicrobial use for coliform infections. This has not worked for everyone, but we have had some successes and plan to continue promoting this to selected farms.

We are delighted with the outcome of the campaign. It was better than we had hoped for and actually much easier to implement than we had anticipated. We believe the key reasons for our success are as follows:

- Above all, it was critical that all staff were fully behind the project – particularly the vets. Delivering a consistent message was crucial to success.
- Benchmarking disease incidence and antimicrobial use for farms of similar size, system and yield was a powerful tool for engaging farmers and facilitating change.
- Taking the time to prepare thoroughly, good communication and a gentle 'planting the seed' approach to encourage changes in antimicrobial use enabled us to avoid upsetting clients.
- Giving clear alternative treatment protocols to replace the CIAs we wanted to withdraw.
- Informing clients about our progress has allowed them to appreciate how making small changes on their own farms has played a part in achieving significant reductions in CIA across the practice.

What next?

We plan to consolidate the work outlined above. Although a very small number of clients remain reluctant to change, there is still enormous scope to reduce antimicrobial use further, through better management, housing and nutrition. We will start more frequent antibiotic sensitivity testing of milk sample isolates to aid treatment decisions. Herd antimicrobial use data produced by the practice will be used regularly during health planning conversations to aid discussion with clients (Box 2 illustrates a case example of herd antimicrobial use data collected for Farm X) . An attempt will be made to reduce the use of long-acting macrolides for managing respiratory disease, something we shied away from in the first phase of our campaign. Improving calf management and promoting vaccination will be emphasised, along with changes in antimicrobial use. Finally, we will think hard about ways to replace income lost as a result of selling fewer or less expensive medicines.

No doubt other farm practices have had similar experiences to ours and they may well have started their journey long before us. However, if anyone is still unsure about tackling this important issue, it may not be as challenging as you think it will be. Our experience has been positive for all concerned.

Box 2: Review of antibiotic use on Farm X from May 2015 until April 2016

This case study of Farm X illustrates how we evaluated antibiotic use on our farms and benchmarked the data.
Farm X has 350 dairy cows and 200 youngstock. The number of antibiotic courses per stock group on the farm are as follows:

- Total cow courses: 674.41 (per animal = 1.93)
- Total youngstock courses: 226.24 (per animal = 1.13)
- Total adult courses that were critical antibiotics: 266.57 (per animal = 0.76)

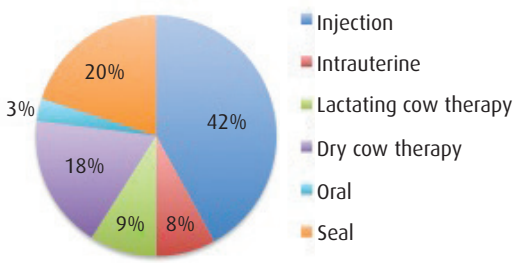
A calculated cow course is the amount of antibiotics required to treat a 650 kg cow or 100 kg calf as recommended in the datasheet that comes with each drug.

Breakdown of the quantity of each antibiotic product used on the farm

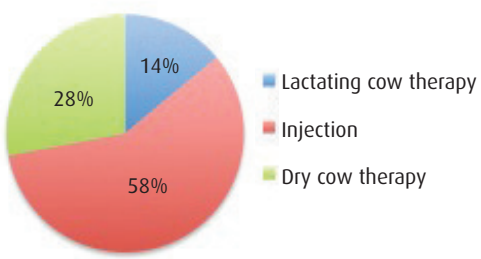
Product	Route	Quantity	Number of calculated cow courses
Adult cow medicines			
Alamycin 10 injection (100 ml) (Norbrook)	Injection	2230.00	22.30
Amoxypen injection (100 ml) (Intervet)	Injection	30.00	0.30
Betamox (100 ml) (Norbrook)	Injection	590.00	5.90
Betamox LA (100 ml) (Norbrook)	Injection	512.00	8.53
Bimotrim Co (100 ml) (Bimeda)	Injection	550.00	5.50
Bovocycline Pessaries (Dechra)	Intrauterine	13.00	4.33
Cefimam LC (x24)* (Norbrook)	Lactating cow therapy	216.00	36.00
Cemay (100 ml)* (Bimeda)	Injection	1900.00	47.50
Cephaguard DC (x60)* (Virbac)	Dry cow therapy	508.00	127.00
Ceporex (100 ml) (MSD Animal Health)	Injection	2200.00	22.00
Cepravin (x20) (MSD Animal Health)	Dry cow therapy	60.00	15.00
Cobactan injection (100 ml)* (MSD Animal Health)	Injection	1275.00	12.75
Cobactan MC (x30)* (MSD Animal Health)	Lactating cow therapy	180.00	30.00
Combiclav (100 ml) (Norbrook)	Injection	400.00	4.00
Mamyzin (10 g) (Boehringer Ingelheim)	Injection	4.00	1.00
Marbox (100 ml)* (Ceva Animal Health)	Injection	242.00	6.05
Metricure syringe (MSD Animal Health)	Intrauterine	70.00	70.00
Naxcel (100 ml)* (Zoetis)	Injection	160.00	7.27
Occrycetin bolus (x20) (Zoetis)	Oral	140.00	23.33
Orbenin LA (x12) (Zoetis)	Lactating cow therapy	15.00	5.00
Orbeseal DC (x120) (Zoetis)	Seal	716.00	179.00
Pen and strep (100 ml) (Norbrook)	Injection	830.00	8.30
Tylan 200 (100 ml) (Elanco)	Injection	500.00	5.00
Ubro red (x20) (Boehringer Ingelheim)	Dry cow therapy	60.00	15.00
Ubrolexin (x20) (Boehringer Ingelheim)	Lactating cow therapy	40.00	13.33
Calf medicines			
Alamycin LA 200 (120 ml) (Norbrook)	Injection	30.00	3.00
Resflor (100 ml) (MSD Animal Health)	Injection	400.00	28.57
Synulox bolus (x20) (Zoetis)	Oral	40.00	6.67
Zactran (100 ml)* (Merial Animal Health)	Injection	752.00	188.00
Anti-inflammatories			
Allevinix (100 ml) (Ceva Animal Health)	Injection	2610.00	50.19
Metacam LA (250 ml) (Boehringer Ingelheim)	Injection	88.50	5.21
Metacam LA (100 ml) (Boehringer Ingelheim)	Injection	805.00	47.35

* Critical course products

Where were the antibiotics used?

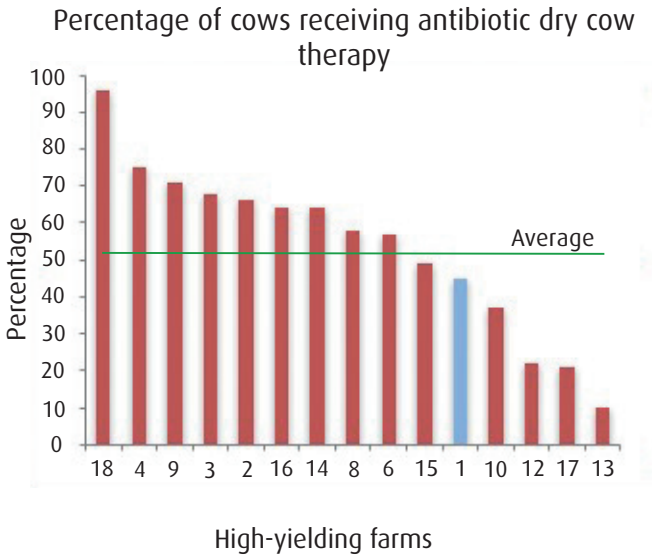


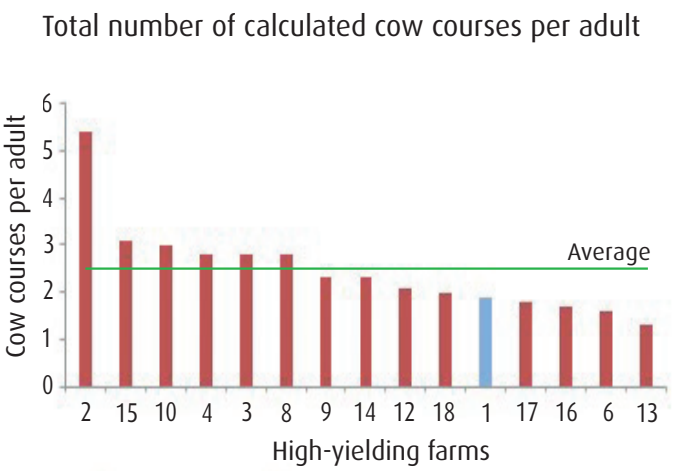
Where were the critical antibiotics used?

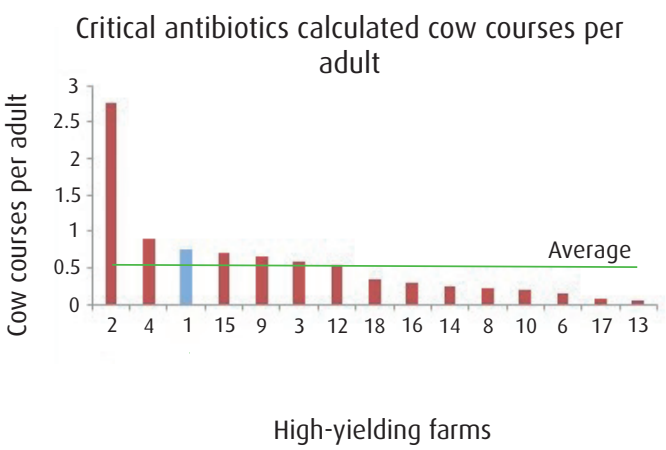


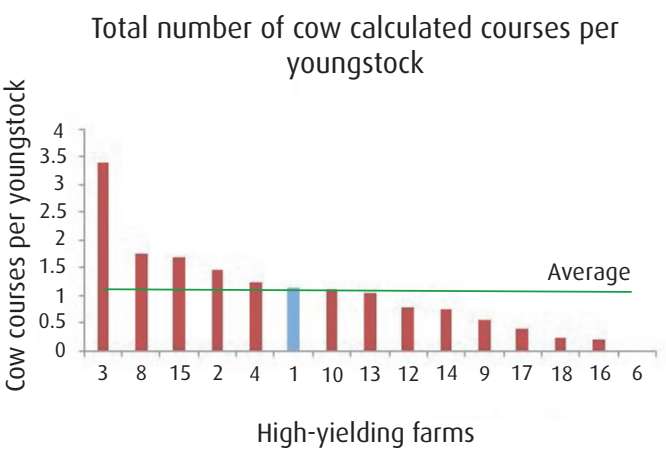
Box 2 continued: Review of antibiotic use on Farm X from May 2015 until April 2016

The following graphs represent how Farm X (blue bars) compared with farms in the high-yielders benchmarking group from May 2015 until April 2016.









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Notes