

This is the peer-reviewed, manuscript version of an article published in *Veterinary Record*. The final version is available online via <http://dx.doi.org/10.1136/vr.j4914>.

The full details of the published version of the article are as follows:

TITLE: The authors of 'Comparison of veterinary drugs and veterinary homeopathy: part 1 and 2', respond

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JOURNAL TITLE: *Veterinary Record*

PUBLISHER: BMJ Publishing Group

PUBLICATION DATE: 28 October 2017

DOI: 10.1136/vr.j4914

IN response to De Beukelaer and others'<sup>1</sup> comments on our review<sup>2,3</sup> of veterinary homeopathy, we welcome the opportunity to emphasise our concerns regarding this unethical practice by commenting on the points raised:

As explained in our review, homeopathy requires the existence of a 'healing force' with multiple supernatural properties. According to scientific understanding, such an entity is extremely implausible, as homeopaths – including De Beukelaer and others – acknowledge. To counter this problem, homeopaths<sup>4</sup> coined the term "plausibility bias" in an attempt to make scientific understanding appear a negative thing and gullibility a positive thing. 'Plausibility bias' presumably applies in the case of all similarly implausible claims – ghosts, clairvoyance, telekinesis, miracles, yetis, etc. Given the consensus that homeopathy is implausible, we believe it imperative that homeopathy's supernatural nature be explained to clients prior to treatment so clients can give proper informed consent.

De Beukelaer and other's main criticism of our review is that 'plausibility bias' prevented us fairly evaluating the evidence regarding efficacy of homeopathy. We dispute that and show below that their examples do not support that claim:

In early meta-analyses of homeopathy, as more and more trials were excluded on the basis of increasing threshold of trial quality, the strength of the positive findings for homeopathy declined but not to zero. Hahn (2013)<sup>5</sup> argued that this non-zero finding implied that homeopathy has efficacy. Hahn's argument is invalid as it falsely assumes that the best available trials excluded all non-specific effects and biases.

Later systematic reviews and meta-analyses by homeopaths<sup>6,7,8</sup> acknowledge the imperfections of the current best available trials. Mathie and others' (2014)<sup>6</sup> systematic review concluded "*individualised homeopathy may have small, specific treatment effects... The low or unclear overall quality of the evidence prompts caution in interpreting the findings.*" Mathie & Clausen's (2014)<sup>7</sup> systematic review concluded that the data "*preclude generalisable conclusions about efficacy of a particular homeopathic medicine or the impact of individualised homeopathic intervention in any given medical condition in animals.*" Their subsequent meta-analysis<sup>8</sup> found only "*very limited evidence that clinical intervention in animals using homeopathic medicines is distinguishable from corresponding intervention using placebos. The low number and quality of the trials hinders a more decisive conclusion.*" Although phrased positively for homeopathy, these conclusions are all consistent with a lack of effect.

This point is illustrated by Camerlink and others' (2010)<sup>9</sup> trial, purported to show that homeopathic *Coli* reduced diarrhoea in piglets. Despite being the only trial showing a statistically significant result for veterinary homeopathy (corrected  $p=0.02$ ; the statistics used in the paper<sup>9</sup> were incorrect) graded as 'reliable evidence' in Mathie and Clausen's systematic review<sup>7</sup> and meta-analysis<sup>8</sup>, it had major flaws<sup>10</sup> (detailed critique supplied on request).

Regarding laboratory evidence for homeopathy, the systematic review of Witt and others (2007)<sup>11</sup> concluded "*no positive result was stable enough to be reproduced by all investigators. A general adoption of succussed controls, randomization and blinding would strengthen the evidence of future experiments*"; identical to our review's conclusion regarding laboratory evidence.

We fully support the EU Commission One Health Action Plan Against Antimicrobial Resistance<sup>12</sup>, as we have discussed elsewhere<sup>13</sup>. Novel drugs and alternatives to antibiotics are much needed. However, those alternatives must be efficacious, and best evidence is that homeopathic remedies are not. Doehring & Sundrum (2016)<sup>14</sup> reviewed this area and concluded that, on farms, "*replacing or reducing antibiotics with homeopathy currently cannot be recommended*" because of lack of evidence of efficacy.

Some forms of complementary and alternative medicine may be efficacious. However, best evidence is that homeopathy is not. In human cancer patients, alternative medicine use instead of conventional treatment is associated with substantially increased risk of death<sup>15,16,17</sup>.

Homeopathy is theoretically implausible and best evidence indicates it is ineffective in practice. Therefore, its use, in place of conventional treatments, on animals that may be suffering, is unethical<sup>2,3</sup>. In our view, the RCVS is failing in its duty as regulator of the veterinary profession and upholder of standards of animal welfare, by not expressing resolute disapproval of veterinary surgeons' use of this pseudoscientific, magical practice.

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