

Book Review: achieving sustainable production of milk

The first two volumes of what will become a three-volume comprehensive and authoritative text covering many aspects of the science of milk production have been released by Burleigh-Dodds (van Beltzen, 2017a, b). Edited by the Director General of the International Dairy Federation, Dr Nico van Belzen, there can be little doubt regarding the scientific quality and likely impact of these volumes. The timeliness is evident; sustainability is a buzz-word on everyone's lips and it is worth noting that these books are part of a series 'Climate Smart Publishing in Agricultural Science' that will run to more than 50 books covering a great many aspects of agricultural production. All credit to the publishers, who on their dedicated website define Climate Smart Agriculture in terms of three key elements:

- Adaptation (to climate change)
- Mitigation (of greenhouse gas emissions)
- Enhanced security (providing increased yields)

It is important, therefore, that '*Achieving sustainable production of milk*' should help to achieve that specific objective. Will it? Volume 1 deals in two parts with milk composition (five chapters) and then genetics and breeding (four chapters). Regrettably, neither section approaches the topic from a sustainability point of view, since such aspects are covered (comprehensively and rather well) in the second volume. From a quality standpoint, I have no issues whatsoever with the milk composition content. The authors are expert, the coverage of established knowledge is excellent and across the chapters there is a good 'build' from basic to applied science. There is some overlap, bio-active factors in milk appearing in several chapters (understandably: it has been a 'hot topic' for approaching two decades) but my bigger concern is structural. There could be good reasons why an analysis of dairy sustainability should start with milk composition, but we are not given those reasons. Indeed, sustainability is hardly mentioned either in the chapters or in the Introduction that prefaces them. With better attention to structural planning, the overall quality of the two volumes could have matched the scientific quality of the chapters. The full title of the first volume's second section is '*Genetics, breeding and other factors affecting quality and sustainability*'. Once again, the scientific quality is excellent if one is prepared to focus on the genetics of factors not directly related to milk quality (but perhaps I have just inferred that '*quality*' is linked back to the first section) and nutrition as it does affect milk quality (so maybe my inference was intended to be correct!). The genetics of fertility is a recurring theme, and it is questionable whether that focus is really what is needed where quality and sustainability are

concerned. Several of the chapters include a much-needed section covering future trends, after all, sustainability is entirely about the future. For the most part these discussions are very sensible, but they are also brief and non-controversial, which is fine for a generically-interested audience but uninspiring for the expert.

Taking the title's sustainability theme at face value, Volume 2 certainly steps up the pace, although not at first. This volume comprises three sections that deal with food safety issues and then generic sustainability followed by quality and sustainability in developing countries. One could argue that product safety aspects would have fitted better as part of volume 1, combined with product quality, but once again the scientific quality of the individual chapters is good, and despite there being 7 chapters the degree of overlap is minimal. Less so the structural planning, which switches backwards and forwards between out-and-out product safety and animal health aspects of product safety (i.e., mastitis). It is nice to observe that this part of the book concludes with a chapter that addresses food safety from a sustainability point of view, incorporating on-farm quality/sustainability management models from Canada, the USA, France and Australia. This is an excellent lead into the second section, where sustainability comes to the fore. Comprising a full eight chapters, this is in itself a reasonably comprehensive account of current knowledge of dairy industry sustainability, although rather importantly it lacks an overtly economic assessment. The overview chapter by Norman Scott and Curt Gooch from Cornell sets the scene well and makes the very valid point that sustainability is something which any industry moves towards over a period of time; tomorrow's concept of sustainability will be different from today's since it is a moving feast, and those that consider sustainability to imply lack of change are getting it diametrically wrong. This chapter is prepared to speculate and be imaginative, and I commend it to every reader. In any topic the imagination needs to go alongside 'dry' science, and in the next chapter this is provided by Sophie Bertrand (France) who gives an accurate account of Life Cycle Assessment models for monitoring environmental impacts. A controversial issue in sustainability is the more-from-less vs food-from-feed argument, i.e., should we feed our ruminant dairy animals a high quality diet to maximise production, or should we make use of their ability to turn plant cellulose into human food? This issue is not specifically addressed in an individual chapter (maybe it should have been) but is tackled in terms of chapters on grassland management (Margaret Graves and Ralph Martin, Guelph), ecological biodiversity (multi-authored from USA and New Zealand) and the special case of organic dairying (multi-authored from Switzerland). The chapter on energy and water management (multi-authored from Ireland and the Netherlands) provides a detailed account of various energy efficiency models with a heavy emphasis on electricity, but does not go as far as to consider

alternative and renewable energies (which would have been useful), and the section on water use really only skims the surface of what will surely become a major issue within sustainability. The New Zealand and UK dairy production industries are compared with other global players by Alison Bailey (Lincoln University, NZ); this chapter is excellent in a current and retrospective sense and provides some insight into the future but without giving as much detail as maybe one would hope for. The section finishes with an overview of the socio-economic and ecological impacts of dairying from one of the largest commercial dairy companies. Fonterra's Jeremy Hill makes an excellent case for the nutritional and societal importance of dairy, and once again this chapter is to be commended for its originality and vision. There is an assumption in the third section of the volume that dairy sustainability in developing countries will revolve around smallholder enterprises. These are the subject of two of the three chapters, first in tropical Asia and then in Africa. Whilst these chapters give excellent accounts of their subject matter, it is important to remember that Asia in particular is a vast and incredibly populous continent that includes some of the largest dairy farms in the world in Vietnam and China. The third chapter in the developing countries section is dedicated to organic dairying. I cannot help feeling that restricting discussion of the part of the world that will change most, demographically, in the next several decades to smallholders and organic producers is doing a disservice to those countries and to the dairy

sector. There is little doubt that short-term sustainability will revolve around improved smallholder units, but is that likely to be the case in the longer term? Why are we not brave enough to contemplate alternatives?

Overall, there are many strengths to these two volumes, but also some significant weaknesses, omissions and lack of structure. For those wishing to know more about the sustainability topic, the second volume is the one to consider, but it is also worth noting that individual chapters can be purchased in online electronic format. By reporting the geographical origin of the sustainability chapters I have highlighted that this topic has global importance, and I hope that the books/chapters will find a large audience and, by doing so, help to achieve the sustainability of milk production that the title promises. A final note: The third volume is edited by John Webster (Emeritus Professor at University of Bristol) and will focus on dairy animal welfare and nutrition. I look forward to seeing it.

Chris Knight, *Editor in Chief*

References

- Van Beltzen N** 2017a Achieving Sustainable Production of Milk, Volume 1: Milk Composition, Genetics and Breeding. Cambridge, UK: Burleigh Dodds
- Van Beltzen N** 2017b Achieving Sustainable Production of Milk, Volume 2: Safety, Quality and Sustainability. Cambridge, UK: Burleigh Dodds