# BRITISH SOCIETY OF ANIMAL SCIENCE

## Guidelines for the Preparation of Summaries for the Occasional Meeting on Traditional and Indigenous knowledge: a resource in developing livestock systems

## Kathmandu, Nepal

## November 2011

A summary of up to 2 pages allows BSAS to referee your proposed paper for scientific content, ethics, presentation and relevance. It will be published in the Proceedings of the above meeting and must be suitable for use as a scientific reference. Submission of a summary is deemed a commitment to present the paper. Please ensure all authors are in agreement with being identified as being associated with the paper.

### Deadline date for the receipt of summaries 15 July 2011

**COMMERCIAL PRODUCTS**
Where results on commercial products are being presented, authors should ensure, before submitting their summary, that both their organisation and the commercial company involved give permission to publish.

**CONTENT**
Summaries should be complete in themselves. The title should be descriptive, specific, and concise. It should state the species concerned. It should replace information otherwise found in the main text. The name of the presenting author should appear first. The Introduction should first state the background and objectives of the work. The Material and methods should describe clearly the methods used, including numbers and types of animals. The Results obtained, together with relevant statistical analysis should be presented in sufficient detail to support the conclusions drawn. The Conclusions should clearly state the author's view of the implications of the results to scientific understanding and practical use. Vague sentences are not acceptable. Authors will be asked to rewrite substandard summaries or the summary may be rejected. Changes and corrections in titles and authors, other than those requested are to be avoided. The summary should be discussed with any co-authors and read critically by a colleague who has not been closely involved. References should be given where appropriate and acknowledgements kept specific to the work being reported.

**Statistical analyses and presentation of results**
Statistical conventions should be those used in Animal. A copy of this can be obtained at www.animal-journal.eu/statistical.

- The experimental design and statistical methods must be clear. Experiments where treatments and pens (or groups) of animals are confounded are not acceptable.
- Treatment means should be presented with appropriate standard errors of means or differences. The minimum number of decimal places required to demonstrate significant differences should be used.
- Probability values must be presented to support conclusions. Probability levels of $P>0.05$ are NOT significant.
- The use of percentages should be avoided wherever possible; concentrations or compositions should be expressed as mass per unit mass or mass per unit volume; decimal proportions should be used for common ratios such as digestibilities.
- The results of surveys will be accepted if the work has been conducted with the same scientific rigour as designed experiments

**Format**
The summary including any tables or figures must fit on to A4, justified with margins of 2.5 cm top, bottom, left and right.

**Typographical Conventions**
Typographical conventions should be those used in Animal. A copy of this can be obtained at http://www.animal-journal.eu/documents/Instructions_to_authors.pdf
Please observe the following:

1. **Title** On the first line type the title of the paper in Times New Roman, 12, bold, lower case. The title should be two lines maximum. No abbreviations please. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Only capitalise the first letter of the first word. No full stop at the end of the title.
2. **Authors** On the next line type the names of the authors in Times 10 lower case. Initials first then the family name without title. Use superscript numbers to distinguish authors with different addresses.

3. **Address** On the next line type the address of the author(s) in Times 10 lower case. Full address, including postcode and country for all authors. No full stop between last item of address and postcode or after country. Use the same superscripts as in authors to distinguish different addresses.

4. **Email address** - please include the email address of the corresponding author on the next line.

5. **Text** Type the entire text of the summary with single spacing in Times New Roman 10 font. Please ensure that British English spelling or US English spelling is used consistently throughout (please do not mixed British and US English spelling). Different sections (introduction, materials and methods, etc.) should be separated by one clear line; section headings should be in bold and text should begin on the line before the section as the heading (see example). Summaries printed in smaller font sizes will be returned. Please use font Times New Roman. The summary may contain graphs and / or tables which complement the text. Summaries should be justified left and right, not centred on the page.

6. **Summaries** should state briefly and clearly the purpose, methods, results and conclusions of the work. Please use the following headings in your summary.

| | |
|---|---|
| Introduction: | Clearly state the purpose of the summary |
| Materials and Methods: | Describe your selection of observations or experimental subjects clearly, including the method of statistical analysis (eg ANOVA) that you used. |
| Results: | Present your results in a logical sequence in text, tables and illustrations |
| Conclusion: | Emphasise new and important aspects of the study and conclusions that are drawn from them |

7. **Tables** Please ensure that the font size in a table is font size 10 and in Times New Roman. Tables should contain normal font Times New Roman (not bold or italics) in font size 10. Only horizontal single lines (equal thickness) should be used in the table (see example). Tables should be numbered sequentially and presented above the Table.

8. **Figures** Graphs should be in black and white, with no border on the legend or the graph itself. Figure titles should be numbered sequentially and be presented underneath the Figure. It is recommended that the width of any diagram submitted should be either 150 mm or 100 mm including the legend at the side. Further recommendations and a specimen diagram is given in the Instruction to authors for Animal (http://www.animal-journal.eu/documents/Instructions_to_authors.pdf)

9. **Acknowledgements** Please ensure that funders of the work are duly acknowledged.

10. **References**. Other studies referred to in the body of the summary should refer to the Author(s) and the year of the study The list of references should be presented at the end of the summary in Times New Roman font size 10. In general the format of the references should follow the recommendations of Animal (Author(s) surname and initials Year. Full title of the journal vol, pages.), however, the title of a Journal article or abstract need not be included (see example). References should be listed alphabetically by first author surname.

11. **Implications.** At the end of the summary please include a section on the Implications of the study (see example)**.** Authors must write maximum 100 words explaining the implications of their work. Implications explain the expected importance or economic, environmental and/or social impact. This must be in simple English suitable for non science readers. The Implications will be peer reviewed.

Please ensure that the layout corresponds with the example summary.

**The 2 page summary should be submitted as A4, preferably using Microsoft Word by**

**15 July 2011** at the latest to:
**Email address: bsas@sac.ac.uk**

## Checklist for summaries:

- ☐ Is British/US English used throughout the summary?
- ☐ Is the complete summary presented in black and white, including graphs and tables?
- ☐ Do the font size and styles conform to summary guidelines?
  - Title: Times New Roman, bold, Font size 12, Lower case
  - Authors, address and corresponding email: Times New Roman, Font size 10
  - Summary: Times New Roman, Font size 10
  - Section headings: Times New Roman, bold, Font size 10
  - Tables and graphs: Times New Roman, Font size 10
- ☐ Do the tables conform to summary guidelines?
  - Font: Times New Roman, Font size 10 (no bold or italic font)
  - Borders: Only horizontal single lined borders used and kept to a minimum
- ☐ Do the graphs/images conform to summary guidelines
  - Font: Times New Roman, Font size 10 (no bold or italic font)
  - Borders: The graph/image should not be framed with a border
  - Colour: Graphs/images are presented in Black and White
- ☐ Do the results comply with the statistical conventions used for Animal?
- ☐ Have the funding organisations that supported the work been acknowledged?
- ☐ Have all authors (and relevant funding bodies and/or commercial) agreed to the submission and publication of this summary in its current form?
- ☐ Does the summary include an implications section?

# Mitigating climate change: the role of livestock in agriculture

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The publication of the Stern review in 2006 (Stern, 2006) stimulated action by a number of governments around the world to initiate bills with targets of up to 80% reduction in emissions of greenhouse gases over the next 40 years. The time for discussion on whether climate change is, or is not, mainly due to human activity is therefore past, experts in all sectors need to be helping governments to identify the best way to reduce the emissions from their sector, while balancing other needs such as economic growth and food production.

The aims of this talk are firstly to highlight some of the issues associated with decreasing greenhouse gas (GHG) emissions from livestock production within the context of increasing concerns about food security and secondly to stimulate discussion as to how the animal science community can best work with governments to provide a robust evidence base for the development and implementation of climate change bills.

Globally, agriculture was estimated to account for an estimated 10-12% or between 5.1 and 6.1 Gt $CO_2$ equivalents of global human-induced GHG emissions in 2005 (Smith *et al*., 2007) 4$^{th}$ assessment IPCC report , but these estimates do not take into account the carbon emissions associated with the fossil fuel used for agricultural activities (e.g. cultivation of soil, harvesting, animal housing) or those associated with land use change. On this basis, the direct emissions of methane from enteric fermentation of 1.9 Gt $CO_2$ equivalents (EPA http://epa.gov/osa/spc/2peerrev.htm) represent up to 37% of agriculture's contribution. Such figures are used to suggest that action should be taken by individuals and governments to decrease the proportion of livestock products in human diets, or indeed to encourage consumers to switch consumption from one species to another. This paper highlights some of the issues which often get ignored in this debate and identifies areas where there is an urgent need for more accurate data based on expert understanding of livestock systems.

**The contribution of livestock to human diets**
At a global level, livestock products contribute ~30% of the protein in human diets, while in industrialised nations this rises to 53%. This figure is predicted to increase, with the global production of meat predicted to increase from 229 million tonnes in 1999/2001 to 465 million tonnes in 2050 and milk from 580 tonnes to 1043 tonnes in the same period (Steinfeld *et al*., 2006). In 2005/6, the mix of species contributing to global meat production was 24% from cattle, 31% from poultry, 39% from pigs and 5% from sheep and goats (FAO Stats).

**Emissions by species**
Estimations of the GHG emissions from livestock are associated with a high degree of uncertainty, given the impact of feed, individual animal productivity and management systems on the emissions per kg product, but estimates have been made. Foster *et al*. (2006) used estimates of 17.4 kg $CO_2$ equivalents /kg product for sheep meat (mutton and lamb); 13.0 for beef, 6.35 for pigs, 4.57 for poultry and 1.32 for milk in the UK, although these figures have also been subject to challenge. There is an urgent need for such figures, however, to enable government and consumers to make choices as to how to decrease the impact of human consumption on GHG emissions. In other words, an opportunity (and indeed a responsibility) for animal scientists to provide accurate evidence as a basis for policy.

**Livestock species and food security**
Globally, the area of land used for grazing is more than twice that used for arable and permanent crops. While some grazed land can be ploughed up for crop production, such a change in land use has a net release of carbon to the atmosphere and in many parts of the world is a high risk venture, due to unpredictable rainfall. It is difficult to see how it would be possible to feed an increasing human population without making use of this grazing land. In addition, the livestock sector accounts for 40% of agricultural GDP, employs 1.3 billion people and creates livelihoods for 1 billion of the world's poor (Steinfeld *et al*., 2006). Significant progress towards the Millennium Development Goals does not therefore needs the increasing demand for livestock products: but as animal scientists we need to be giving advice as to best to achieve this while minimising our carbon footprint.

Money is the main currency underpinning free trade agreements and carbon the main currency underpinning climate change bills. As natural resources become ever scarcer, greater consideration may need to be given to efficient utilisation of resources which are edible by humans. Maybe we need to be considering an additional 'currency' of human edible resources?

One of the arguments against livestock is that they are inherently inefficient components of the food chain, since the production of feed, prior to its consumption by animals represents a 2-stage process, with each stage 'leaking' energy through less than 100% conversion efficiencies. The CAST report (CAST, 1999) provided alternative ways of

calculating efficiency. It gave comparisons of the relative efficiencies of livestock systems in producing food for a range of countries on the basis of both gross efficiencies and 'human-edible return'. This latter ratio recognises the contribution which livestock can make by converting fibrous feeds which are not used by humans into livestock products which do meet human needs. Some examples are given in Tables 1 and 2.

**Table 1** Beef: gross efficiencies of conversion of diet energy and protein to product and returns on human-edible inputs in products[a]

| | Energy | | Protein | |
|---|---|---|---|---|
| Country | Gross efficiency | Human edible return | Gross efficiency | Human edible return |
| Argentina | 0.02 | 3.19 | 0.02 | 6.12 |
| Egypt | 0.03 | NC[b] | 0.02 | NC |
| Kenya | 0.01 | NC | 0.01 | NC |
| Mexico | 0.06 | 16.36 | 0.02 | 4.39 |
| South Korea | 0.06 | 3.34 | 0.06 | 6.57 |
| United States | 0.07 | 0.65 | 0.08 | 1.19 |

[a] Gross efficiencies calculated as outputs of human-edible energy and protein divided by total energy and protein inputs. Human-edible returns calculated as human-edible outputs divided by human-edible inputs.
[b] NC = not calculated. Human-edible returns for Egypt and Kenya were not calculated because human-edible inputs are very low or nil, which would have resulted in values approaching infinity.

**Table 2** Swine: gross efficiencies of conversion of diet energy and protein to product and returns on human-edible inputs in products[a]

| | Energy | | Protein | |
|---|---|---|---|---|
| Country | Gross efficiency | Human edible return | Gross efficiency | Human edible return |
| Argentina | 0.15 | 0.24 | 0.07 | 0.11 |
| Egypt | 0.16 | 0.64 | 0.09 | 0.43 |
| Kenya | 0.16 | 0.54 | 0.10 | 0.39 |
| Mexico | 0.13 | 0.25 | 0.08 | 0.21 |
| South Korea | 0.20 | 0.35 | 0.16 | 0.51 |
| United States | 0.21 | 0.31 | 0.19 | 0.29 |

[a] Gross efficiencies calculated as outputs of human-edible energy and protein divided by total energy and protein inputs. Human-edible returns calculated as human-edible outputs divided by human-edible inputs.

These data indicate the range of efficiencies in resource use in livestock systems around the world. The data are incomplete and livestock systems are ever changing, largely in response to economic factors. Again there is an opportunity and a responsibility for animal scientists to provide an accurate evidence base to underpin the choices of individuals and governments on how to achieve food security, while also taking account of climate change and the availability of natural resources.

**Acknowledgements**
Eric Bradford and Lee Baldwin who were both eminent animal scientists and key thinkers behind the CAST report both died in 2007. Their legacy lives on.

**References**
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