

# **INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE**

## **GLOBAL CONSULTATION ON LIVESTOCK, ENVIRONMENT AND HUMAN NEEDS**

### **PROJECT COMPLETION REPORT**

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**Submitted to: IDRC**

**By: International Livestock Research Institute (ILRI)**

**Date: December 1998**

### **Executive Summary**

#### **Background**

A global consultation on Livestock, Environment and Human Needs was jointly organized by ILRI, IDRC, FAO and INFORUM, with participation of The World Bank and the Interamerican Institute for Cooperation in Agriculture (IICA). The consultation was a follow-up to a multi-donor study titled "Balancing Livestock, Environment and Human Needs", carried out by FAO, USAID and The World Bank.

This report gives a full account of the planning, conducting, participation, results and conclusions of the global consultation. It also includes a discussion of lessons learned and a discussion of proposed follow-up activities.

#### **Objectives**

- Give stakeholders the opportunity to include their views on livestock, environment, and human welfare interactions in a position paper to be developed at a global meeting in The Netherlands in June 1997.

- To identify strategies to alleviate the negative and enhance the positive impacts of livestock on natural resources in different eco-regions.
- To identify areas of common interest which can lead to future research and development through institutional collaboration, partnerships, and networks.

### **Description of the project**

The global consultation had two major components: i) a world wide electronic conference, and ii) local, non-electronic consultations held in several developing countries of Asia, Africa, Latin America and the Caribbean.

The local consultations gave stakeholders from developing countries, which might have no access to E-mail, the opportunity to have their views on livestock, environment and human needs interactions inputted to the E-mail global conference.

The global consultation was conducted in the period between March 10 to May 30, 1997. On June 16-20, 1997, the results of the global consultation were presented at the International Conference Livestock and the Environment in The Netherlands.

### **Conclusions and recommendations**

Main conclusions from the global consultation were:

- Deforestation, soil erosion, reduced soil fertility, biodiversity losses, water contamination, waste disposal, and greenhouse gasses emissions are degrading the environment.
- There is a poor response of society to environmental degradation, due to the low awareness of environmental issues.
- There is a lack of effective social participation in policy making and mechanisms to enforce environmental legislation.

- Livestock get a lot of unsubstantiated blame for environmental degradation.
- Examples of successful strategies to enhance positive and limit the adverse effects of livestock on the environment are found.
- There is a paucity of information on livestock agriculture and the environment.
- There is a lack of systems approach and true interdisciplinary research.
- There is not enough broad-scale focus in research.
- There is a rift between scientists and policy-makers thus policies are often designed without a holistic analysis of the problems and without any technical argumentation.
- There is a rift between farmers and scientists as their sources of knowledge and their practical experience are different.
- The livestock sector is reluctant to change from its focus on how to produce more, even though livestock specialists are trying to look at livestock production in a broader context.

Main recommendations from the global consultation were:

- Environmental standards to avoid pollution should be internationally agreed.
- Refocusing research through the use of a true interdisciplinary systems approach.
- Empowerment should be given to grassroots organizations.
- To bridge the gap between scientists, producers and policy makers in order to provide a holistic analysis of the problems and allow the argumentation by all interest groups.
- Livestock projects should be tied with the condition that they deal with concomitant environmental effects and policy analysis and design.
- To develop academic training programs that incorporate issues such as sustainability, natural resource protection, gender in the rural context, and knowledge generated by local research.
- The establishment of a Virtual LxE Center.
- Internalizing of environmental costs

- Inclusion of environmental issues in policy formulation
- Environmental Impact Assessment should become an integral part of development projects.
- More investment in research
- Development of technologies that enhance productivity with no adverse effects on the environment
- Economic terms of exchange between rural and urban products should be equitable
- Increase public awareness of environmental issues
- Raise education levels in rural areas
- Create effective mechanisms to enforce environmental legislation

### **Follow-up activities**

Proposed follow-up actions includes:

- The design of a tool kit to facilitate the policymaking process with regard to livestock, the environment and human wellbeing.
- Design of multidisciplinary, eco-regional research projects to be submitted to funding agencies. Health and nutrition variables should be incorporated as important components of project design and appropriate health and nutrition indicators should be used to evaluate project outcomes.

The addendum to this report provides a description of publications produced and follow-up activities carried out since the date this report was written.

### **Acknowledgments**

We duly acknowledge the following collaborators:

IDRC

FAO

INFORUM

IICA (RISPAL)

IICA (Technical Cooperation Office in Panama)

Global Consultation Management Team (Don Peden, Hugo Li-Pun, Cees de Haan, Henning Steinfeld, Robert Hart, Mamadou Diedhiou, Emmanuel Mwendera and Victor Mares).

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Contributors of specific tasks were: Helen Rajj (IDRC/LARO, Uruguay), Nadine Saad (IDRC, Canada).



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**Date:** December 1998

### **I. INTRODUCTION**

A global consultation on Livestock, Environment and Human Needs was jointly organized by the International Livestock Research Institute (ILRI), IDRC, FAO and INFORUM, with important participation of The World Bank and the Interamerican Institute for Cooperation in Agriculture (IICA). The consultation was a follow-up to a multi-donor study titled Balancing Livestock, Environment and Human Needs, carried out by FAO, USAID and The World Bank. The European Union, The World Bank, and the governments of Denmark, France, Germany, The Netherlands, The United Kingdom and the United States of America funded this study. This multidonor study originated from a 1992 meeting convened by The World Bank and USAID for donors, in which it was observed that support for research on livestock was decreasing. This was mainly due to negative claims that livestock was responsible for environmental degradation. It was agreed that there was a need to take a more rational and scientific approach to the issue of livestock-environment interactions by assessing more objectively the role of livestock in environmentally sustainable agriculture, considering both negative and positive effects.

The global consultation had two major components: i) a world wide electronic conference, and ii) a number of local (both national and regional), non-electronic consultations held in several developing countries of Asia, Africa, Latin America and the Caribbean.

This report gives a full account of the planning, conducting, participation, results and conclusions of the global consultation. It also includes a discussion of lessons learned and a discussion of proposed follow-up activities.

This document constitutes the final project report submitted to IDRC by ILRI. The former was the project-funding agency and the latter was the recipient of the grant. It is very important to notice that all information and comments included in this report comes from different internal documents produced by the management team before, during and immediately after the global consultation. To avoid a repetitious quoting of different internal reports and messages, this final report should be considered as produced by Hugo Li Pun, Victor Mares, Bob Hart, Mamadou Diedhiou, and Emmanuel Mwendera.

## **II. PLANNING OF THE GLOBAL CONSULTATION**

The global consultation was planned in a meeting held in Addis Ababa from 21 to 24 January 1997. Present in the meeting were the following:

Dr. Hugo Li-Pun, ILRI (Chairperson)

Mr. Ralph Von Kauffmann, ILRI

Dr. Don Peden, IDRC

Dr. Victor Mares, ILRI Consultant

Dr. Henning Steinfeld, FAO

Dr. Robert Hart, INFORUM

Dr. Mohamed Saleem, ILRI

Dr. Simeon Ehui, ILRI  
 Dr. Pascal Osuji, ILRI  
 Dr. Eddie Mukasa, ILRI  
 Mr. Mamadou Diedhiou, ILRI  
 Dr. Emmanuel Mwendera, ILRI

The following sent apologies:

Dr. Cees de Haan, World Bank  
 Dr. Harvey Blackburn, USAID  
 Dr. Manuel Ruiz, IICA  
 Dr. Carlos Sere, IDRC  
 Dr. C. Devendra, ILRI Consultant  
 Dr. Euan Thompson, ICARDA  
 Pr. Eb Olaloku, ILRI

The planning meeting developed the framework and workplans for both the electronic conference and the local, non-electronic consultations. A conferencing team was assembled to take responsibility for the following functions:

1. Computer hardware and software management for the E-conference

Lead: Robert Hart

Others: John Rowell (FAO) and Mamadou Diedhiou (ILRI).

2. Information management for the E-conference

Lead: Victor Mares

Others: Takuo (FAO) and Emmanuel Mwendera (ILRI)

The responsibility was subsequently reassigned to Bob Hart.

3. People management (facilitator) for the E-conference

Lead: Robert Hart

Others: Victor Mares

#### 4. Subject matter management (moderator) for the E-conference

Lead: Victor Mares

Others: Henning Steinfeld, Emmanuel Mwendera, Cees de Haan, and Manuel Ruiz.

#### 5. Overall E-conference coordination

Lead: Robert Hart

Others: Victor Mares, Hugo Li Pun

#### 6. Organization of the local consultations

Lead: Victor Mares

Others: Emmanuel Mwendera

#### 7. Overall responsibility for the project

Hugo Li Pun

The agenda of the E-conference was also developed during the planning meeting.

A full report of the planning meeting and the work plans for both the electronic conference and the local consultations was opportunely sent to all concerned.

### **III. OBJECTIVES OF THE GLOBAL CONSULTATION**

The multidonor study on Balancing Livestock, Environment and Human Needs prompted IDRC to consider the importance of putting their conclusions to the scrutiny of all stakeholders, particularly from developing countries, and to give them the opportunity to have their views presented in a global meeting in The Netherlands,

convened to present the results of that study to donors and research organizations. Consequently, the objectives of the global consultation were:

1. Give all stockholders the opportunity to have their views on livestock, environment, and human welfare interactions included in a position paper to be developed at a global meeting The Netherlands in June 1997.
2. Based on all stakeholders perspectives, to identify policy, research, extension, and other strategies to alleviate the negative and enhance the positive impacts of livestock on natural resources in different types of livestock production systems in different countries and eco-regions.
3. To identify areas of common interest which can lead to future research and development institutional collaboration, partnerships, and networks.

#### **IV. CHRONOGRAM OF ACTIVITIES**

1. January 21-24, 1997:
  - Global consultation planning meeting.
2. February to March 10, 1997:
  - Setting up the electronic services
  - Invitations to potential conferees
  - Helping people to subscribe to the lists
  - Organizing the local consultations
3. March 10 to May 30, 1997:
  - Formal E-conference period
  - Local consultations organizing and completion

4. June 1-5, 1997:

Evaluation of the E-conference by conferees

5. June 1-15, 1997:

Preparation of global consultation results

6. June 16-20, 1997:

Presentation of global consultation results at the International Conference Livestock and the Environment in The Netherlands.

7. November 1997:

Preparation of final report of the global consultation

8. December 1997:

Submission of final report to IDRC.

## **V. THE ELECTRONIC CONFERENCE**

As mentioned before, one of the two major components of the global consultation was the electronic conference. In this chapter we describe the logistic aspects of the electronic exchange, the E-conference procedure and participation, summarize the groups and plenary discussions, and summarize the conclusions and recommendations.

### **1. Logistics of the Electronic Conference**

The information of the Electronic Conference was exchanged through FAO's central computer in Rome. Two types of electronic services were set up in that computer: i) six Email lists, one used for the plenary discussions (LxE-L), four used for the group

discussions on grazing, mixed and industrial production systems and cross-system issues (LxEGRA-L; LxEMIX-L; LxEIND-L; LxECSY-L) and one used by the management team (LxETeam-L); and ii) an archive from which conferees could automatically retrieve files by sending in Email messages.

Additionally, two other types of electronic services were set up at IDRC's central computer in Ottawa: i) a "mirror" of the LxE-L list on <http://www.findmail.com/listsaver/lxe-l/> and, ii) IDRC's Home page with information on conference invitation, procedures, and key note papers on [http://www.idrc.ca/plaw/livestock\\_e.html](http://www.idrc.ca/plaw/livestock_e.html)

## **2. Procedures of the Electronic Conference**

The first step of the formal electronic exchange was the subscription to the lists. Detailed instructions on how to subscribe were sent along the invitation to participate. To subscribe, people sent a message (subscribe LxE-L) to the address <Mailserv@Mailserv.fao.org>.

The number of participants and the amount of contributions to the discussions are indicated by some key conference statistics:

1,045 people subscribed to the LxE-L list.

Subscribers represented 86 countries.

764 people sent personal introductions

83 countries were represented by personal introductions

147 people participated in the exchange by either sending in case studies or commenting during the discussion.

85 people participated in the plenary discussions.

33 people participated in the grazing systems group discussions.

29 people participated in the mixed system group discussions.

7 people participated in the industrial system group discussions.

Participants submitted 78 case studies

40 countries were represented by case studies.

5 chapters in the multi-donor study on livestock and the environment were disseminated as discussion papers.

For the formal exchange, a detailed agenda was followed. At the start, the organizers welcomed conferees, the agenda was distributed and people were invited to submit case studies. A total of 70 case studies (34 grazing systems, 29 mixed systems and 7 industrial systems) were sent by participants.

The case studies came from the following countries:

Argentina: 2; Australia: 6; Benin: 1; Bolivia: 1; Botswana: 1  
 Burundi: 1; Canada: 3; Cape Verde: 1; Colombia: 1; Costa Rica: 1  
 Chile: 1; China: 1; Ecuador: 2; Ethiopia: 1; Dominican Republic: 1  
 Greece: 2; Honduras/Nicaragua: 3; India: 1; Italy: 1; Malawi: 1  
 Mexico: 3; Mongolia: 1; Nepal: 1; Niger: 2; Nigeria: 1; Pakistan: 2  
 Peru: 2; Scotland: 2; South Africa: 1; Spain: 1; Switzerland: 1  
 Tanzania: 4; The Netherlands: 1; Tunisia: 1; Uruguay: 2; USA: 8  
 Venezuela: 1; West Africa: 2; World: 1; Zimbabwe: 1

The conference had three distinct phases: a plenary initial discussion, a period of parallel group discussions, and a final plenary session. For the group discussions, conferees subscribed to each independent list. Summaries of the discussions were prepared and delivered by the moderator. In the final phase, which lasted three weeks, conferees reassembled again for a final plenary discussion in order to produce main conclusions and recommendations. The moderator also summarized the final plenary discussion. All summaries are presented in the appropriate sections of this report.

## 2.1. The first plenary session

The first plenary session extended for three weeks and was dedicated to review and comment the keynote paper. This paper was the Chapter 1 of the multi-donor study. The chapter provided an overview of Livestock, Environment and Human Needs Interactions. Most comments from the participants expressed the view that the paper was very informative and thought provoking. Henning Steinfeld and Cees De Haan responded comments and criticisms. Their comments are transcribed below.

“Thank you all for taking the time to read through the keynote paper and for your comments. We have looked at the comments received to date 21 March 10.00 UST and would like to reply, in brief. Several issues have been raised which will be dealt with in more detail in the following discussions in the parallel sessions or groups. It is clear that when limited to six pages on such a complex issue and looking globally, we had to be rather general. Again, in our response we'll be very superficial on those issues, as we do not want to jump ahead. There are also many suggestions and criticisms on the apparent lack of measures to address livestock-environment imbalances, for example made by Aslam Pervez Umrani. Again we would like to leave this discussion for the working groups and the conclusions. Two contributors, Jim McLaren and Dan Brockington propose a broadening of the debate away from the focus on livestock to a wider perspective of systems dynamics, highlighting the current debate over steady state versus chaos in ecosystems.

The triangle of Livestock, Environment and Human Needs obviously has some magic. We all tend to lean to one angle. Some attribute sinister motives to those who attack livestock. Others foster “demand management” as the solution to livestock-environment problems. Belinda Walker stresses the need to slow population growth and to reduce the demand for livestock products as an important measure to address livestock-environment imbalances. Population growth, urbanization and increasing incomes all contribute to the surge in demand for livestock products. Demand management is certainly an option: for the developed countries per caput consumption can be regarded

excessive and it is, indeed, in decline as a reaction to health concerns. In the developed countries, per caput consumption will still increase for many years to come but population is slowing down, at least in percentage terms.

Brent Auvermann disagrees with our blame on those who blame livestock rather than people. We are aware that phrases like “livestock cause “ may be shorthand for the obvious to many. But it is still helpful to point to sloppy language where it may lead to sloppy thinking. Findlay Pate seems to agree here. And this sloppy thinking, as we stress in the paper, has led to donors and governments abandoning the livestock sector rather than seizing the opportunities that this fast growing, demand driven subsector holds.

We very much enjoyed Simon Anderson’s comments on the dialectical nature of the process of livestock environment interaction and related human expectations. He also links environmental degradation to the livelihood status of those using the environment, and concludes that the trade-off between increased livestock productivity and (negative) environmental impact needs to be optimized. Fortunately, there are not always such trade-offs as there are a number of win-win situations, where environmental benefits and productivity increases (or individual economic benefits) coincide. Examples, which will be described later, are nutrient recycling in the mixed farming system, the potential synergies between wildlife and livestock and livestock and plant bio-diversity, and waste conversion into energy. In that regard Smith calls for a paradigm shift, and we fully agree: acknowledging that much of the degradation attributed to livestock can be restored by livestock - if properly managed.

Don Nicol rightly stresses the importance of minerals in livestock products, such as iron and zinc, for human nutrition. We also agree with his statement that “it is the diet that is unhealthy (in developed countries) not the livestock product.

With regard to the overgrazing issue, Alex Schumacher is right in saying that Northern Asia (Mongolia and Inner Mongolia) too has severe problems of land degradation. Other areas include Central Asia and parts of the Near East. While we have talked about the limited potential of grazing systems to contribute to the surging demand in the

global context, Raul Vera provides evidence that, in Latin America, there is still lot's of scope for increasing production and technologies are being applied that successfully intensify those systems (Argentina, Uruguay and Southern Brazil). A similar point is made by Ronald Nigh who states that for tropical areas of Mexico, it would be possible to increase livestock production while reducing the area currently devoted to pasture.

We do not quite agree with Alex Schumachers statement that "an important social factor... in N. Asia as it is with Sub-Saharan, is the maintenance of large herds as indicators of wealth and social status rather than for purely commercial purposes." In fact, there is ample evidence that while wealth and status are important motives for keeping animals this is in line with economic objectives. This means that animals of low productivity are held where the costs for this are low, typically in areas where communal range provides feed of no costs to the individual. Lawrence Tawah, stressing the role of land tenure systems in this regard raises the same issue. We would like to point to the summary paper on grazing systems to be released next week where these issues will be discussed in more detail. The important comments made by Michel Bigras-Poulin and Johann Hesse on the complex nature of interactions between grazing livestock and eco-systems as well as on our perception of related degradation problems are well taken. Particularly important is the proposed analysis of why certain technologies known to halt degradation or to improve the environment have found little adoption in many countries.

Dan Brockington's comments, mainly referring to pastoralists in semi-arid Africa, question whether degradation is occurring at all, what livestock's role is in that process and how outside forces interfere. We have, in our study dealt with these issues, and will present the findings in the summary paper on grazing systems to be released next week. We certainly agree with the resilience of these arid lands. To answer your question about livestock being squeezed into degradation (perhaps not the most fortunate language) we refer to outside forces, such as policies, settlements, infrastructure development, etc. that interfere with opportunistic management of pastoral resources under highly variable conditions (arid grazing lands). This point is

also made by Mohamed Saleem who stresses the ecological and economic rationale of traditional land use of grazing lands as part of a “coherent, adaptive response”.

Lawrence Tawah states that “the issue of intensification of livestock production and its consequences can only partially be attributed to livestock production in the developing world” and that “the predominant production systems in sub-Saharan Africa is pastoral”. During the study we had to correct our own perception on the proportions of pastoral systems, mixed crop livestock systems and what we now call “industrial” production. As part of the study we conducted an analysis of world livestock production systems, trying to quantify the three major groups and even further sub-divisions by agro-ecological zones. In terms of meat production, land-based systems still provide a large share of the total output; 89 percent of the beef, 61 percent of the pork, and 20 percent of the poultry meat, representing about 60 percent of the total meat production. Among the land-based production systems, the mixed farming systems contribute about 90 percent of the meat production. Production based on pure grazing systems is therefore relatively unimportant, and grows also at the lowest rate. Pastoral systems production grows at 1 percent, mixed farming at 3 and industrial production at more than 7 percent. It is clear that the balance is changing in sub-Saharan Africa too and that intensification is on its way, although in certain areas horizontal expansion may still be an option.

In response to Darwin Murrell’s question, the expansion of production into more humid areas is not so much the result of disease control but of population pressure which is progressively destroying the habitat of the tsetse as the carrier of the African Animal Trypanosomiasis.

Moving to Mixed Farming Systems, William Lazarus asks for clarification on the section of the keynote paper, which addresses “the biggest contribution of livestock to the environment to be seen in providing the main avenue for sustained intensification of mixed farming systems”. First of all, mixed farming systems are defined over the integration of crop and livestock activities on the same farm, one providing inputs to the other. What we mean is that if livestock’s input functions (manure, draught) had to be substituted by other means (inorganic fertilizer, tractors) this would be at high

environmental costs and it would even be, in some cases, impossible. We would even go as far as saying that, historically, agricultural intensification and hence, human development, would not have taken place were it not for this millennia-old association of humans, animals and crops.

Aslam Pervez Umrani stresses the need to develop different strategies for different stages of development and different agro-ecological settings. This is obvious, as resource use, demand, and technological opportunities differ. Umrani calls for low input extensive farming for livestock production for the temperate zones. The counter-argument would be that much more land would be required to meet current demand, which again would limit the approach to situations where there is over-production or it would result in even greater environmental damage. Umrani makes a number of valuable suggestions on straw treatment and remote sensing which will be discussed in the working groups starting next week. We are particularly looking forward to the discussion on opportunistic management of pastoral resources.

Ronald Nigh also calls for a return to “cows on pasture”, to reduce the dependence on feed crops, especially those produced by energy and chemical-intensive methods.” The question, however, arises, whether cows on pasture can sustain current and future production levels, as these are in continuous decline as providers of animal protein. Roberto Langstroth, too, suggests that “the cow is better than the plow” in terms of biodiversity and that developing countries need to develop policies that rationalize land use.

Findlay Pate disagrees with the emphasis given to greenhouse gases. We would very much like to leave this discussion to the group dealing with cross-sectional issues where this can be discussed in more detail. While “the world’s animal population has changed little over time” (Findlay Pate) the share of domesticated animals is now larger than that of wildlife and, thus, has become anthropogenic. This needs to be acknowledged and addressed (without assisting “radical movements for sinister purposes”), and there are technologies to reduce emissions per animal product. Thomas Sauer and Michael Undi had an exchange on the emissions of methane by

livestock. According to background work conducted for the multi-donor study led by Michael Gibbs (IFC) the total methane emissions by livestock amount to 86.6 million tons, of which more than 80 percent (74.5 million tons) comes from digestive fermentation, mainly in ruminants."

## **2.2. Parallel groups discussions**

For the second phase, which extended for six weeks, four parallel groups were organized to discuss livestock-environment interactions in grazing, mixed, and industrial systems, and the cross-systems issues. To promote and focus the discussions, these groups received the corresponding case studies sent by participants and the relevant chapters from the multi-donor study. Consequently, group discussions were divided in two periods, one centered in the case studies and the other focusing in the corresponding chapter of the multi-donor study. Conferees received an abridged version of the chapters, edited by Bob Hart. However, the full chapter was made available by automatic retrieval from the archives. Following, we provide an account of the discussions in each group, as summarized by the moderator.

### **2.2.1. The grazing systems group discussion**

This section summarizes the discussions of both the case studies and the corresponding chapter of the multi-donor study.

#### **a) Summary of the discussion of the grazing systems case studies**

The first period of group discussions centered on case studies, which provided information about a set of key questions. Participants sent a total of 34 grazing systems' case studies. All case studies are archived at FAO's computer and are electronically available to subscribers to the LxE-L list.

The case studies came from the following countries:

Argentina (1); Australia (5); Bolivia (1); Botswana (1); Canada (1); Cape Verde (1); Colombia (1); Costa Rica (1); Ecuador (2);

Honduras/Nicaragua (1); Mexico (1); Mongolia (1); Niger (2); Pakistan (1); Peru (1); Scotland (2); South Africa (1); Tanzania (2); Uruguay (1); USA (5); West Africa (1); and Zimbabwe (1).

The discussion was opened by the question about how best we could classify or group the underlying causes of livestock-related environmental degradation. This opening prompted Sandra H. Hodge to propose an analytical framework, which linked culture, social organization, population, environment and technology to discuss how causes might be classified. She argued that her framework could contribute to develop strategies, which are appropriate, and sustainable solutions to the observed degradation, by addressing the underlying causes identified within each one of the interactive categories of the framework. Several contributions in this and the MIX group led to the assertion that policy is a key element controlling the interaction of livestock and the environment.

Isaac Odeyemi argued that any policy which will influence the behavior or activities of livestock producers quite often also affect the environment. He extracted from his contribution to a similar conference and pointed out that although the environment was not in the agenda of the initial policy makers (about privatization of Animal Health Delivery Services in Africa), there is a need now to start taking steps to prevent genuine problems in the future, at least by opening the debate. He suggested that the appropriate approach would be to put in place a comprehensive environmental impact assessment process.

Kofi Anani considered that policy formulation shouldn't be based on a narrow perception of the environment, which tend to prioritize technology determinants. His comment was prompted by his perception that the case studies conceptualized the

environment mainly in biophysical and ecological terms. He argued that the current state of events within the global economy benefits certain people in various regions and marginalizes millions of people all over the globe. As he stated that the major beneficiaries are directly or indirectly involved in the global policy making process, the implication is that the challenge is how to persuade someone to initiate reform of a process of which he or she is the beneficiary.

Prompted by a question raised by David J. Ligda, Guillermo Schnitman pointed out that although some grazing systems in the pampas of central Argentina are moving towards intensification, they continue to be energy efficient and highly productive. David J. Lidga raised a further question. It was about the characteristics of the old pampas system that will allow it to survive against the trend of intensification (and perhaps replacement by cropping systems as previously mentioned by Raul Vera in the LxE-L discussion).

Guillermo Schnitman argued that it is important to notice that livestock production in the pampas does not rely on deforestation given that for centuries the Pampas were prairies. This assertion struck Roberto Langstroth as interesting as this agroecosystems could be more easily managed (more stable perhaps?). He pointed out that the Llanos of Moxos (savannas) in Bolivia which have been grazed by cattle for over three centuries are far from being degraded. However, he claimed that the Llanos would be threatened by a change toward crop production. The willingness of consumers to pay a premium for ecological protection was also discussed.

David J. Ligda argued that higher food costs are the only way to finance ecological improvements but some participants disputed his statement.

Aslam Pervez Umrani tried to draw attention to theory by disputing the adoption of “non-equilibrium” theory, implicit in some of the case studies, to explain vegetation dynamics in arid zones. One of his concerns applied to policy formulation as he claimed that a policy based on wrong theory will fail. Pierre Hiernaux supported his views.

## **b) Summary of the discussion of the grazing systems chapter**

The second period of group discussions in this room focused on the grazing systems chapter of the multi-donor study on Livestock and the Environment. This discussion period considered two central aspects of the chapter: the characterization of hot spots and driving forces on the one hand and the recommendations on the other. This report summarizes the comments and contributions on both the diagnostic and the recommendations aspects of the chapter.

Aslam Pervez Umrani stated that although the chapter provides a good overview of environmental challenges to grazing systems in different ecosystems, it is still deficient in (the discussion of) grazing systems of the temperate regions and arid areas. He showed his concern about the support given by the authors to the opportunistic way of land utilization in arid areas. He claimed that the application of the theory of “constant disequilibrium” is not the right solution and that it provides a tool to those who are interested in the opportunistic over-exploitation of arid rangelands.

Pierre Hiernaux shared the worries expressed by Aslam Pervez Umrani on the adoption of the non-equilibrium theory to explain vegetation dynamics (and justify the opportunistic grazing system in arid areas, I presumed) but cautioned that some of the conclusions drawn from the theory need to be mitigated (re-examined?). Pierre added that mobility of livestock is the main tool of the opportunistic strategy in pastoral resource use, but cautioned that it does not systematically allows adjustment to resources availability because livestock numbers, composition and location depends on factors that are not controlled by pastoralists, such as markets, water points, social and economic ties with agro-pastoralists and urban populations.

Burton Smith agreed with Pierre Hiernaux, adding that it is not justifiably to use non-equilibrium theory to explain the presence of annual plants and justify their subsequent over-utilization in semi-arid ecosystems. He argued that once a plant community passes beyond a threshold, doing less of the same will not restore it to its original state and that any grazing management strategy that ignores the concept of threshold is strategy only if the objective is to mine the land.

W. Whitford commented that there is evidence, which support the threshold concept. However, he argued that one of the most significant problems in rangeland management anywhere is to recognize when the threshold is being approached and to then change management strategies to avoid pushing the system over the threshold.

Peter Scogings agreed with the reservations about arid and semi-arid lands expressed by Hiernaux, Umrani and Smith. Scogings thinks that the statements made on arid and semi-arid systems by the authors of the multi-donor study are dangerous generalizations and point to a need for research aimed at treating the disequilibrium claims as hypothesis that need testing. He claims that there is a warning here (in several contributions to the conference) that only with strong understanding of all the ecological and sociological processes in the interaction between humans and natural resources in the different systems will it be possible to suggest, without gross speculation, appropriate policies and developments that balance livestock, environment and human needs. In his own opinion, the ultimate driver of degradation is human population growth.

However, in a contribution to the Mix system discussions, Stephen Zolvinsky suggested that we need to more critically examine the idea that overpopulation causes environmental degradation as he thinks this approach is over-simplistic. Along this way of thinking, Maryam Niamir-Fuller suggested that quick judgments on the impact of livestock on the environment serve us no good and that we need to look deeper into the root causes of overgrazing. She pointed out that a few in-depth studies are showing that the root causes of overgrazing in Mongolia are: i) the breakdown of a network of dispersed rural social and economic services previously provided by the Russian-based system, which forced pastoralists to concentrate around fewer service centers, and ii) economic hardship for many former civil servants who, not finding any other sources of income, have turned to livestock raising in peri-urban areas. Adding to uncertainties about causes of overgrazing and degradation, Oyun-Erdene did not agree with Maryam Niamir-Fuller's comments. He thinks that the main cause of degradation in Mongolia is drought, associated to an increased number of domestic animals.

Pierre Hiernaux commented that patchiness (spatial heterogeneity of vegetation attributes such as cover, mass and species composition) in a range in Mali varied from year to year; drought promoted patchy patterns while grazing reduced them. However, the evenness fostered by grazing did not increase the sensitivity of the vegetation to droughts. He joined Peter Scogings in asking more research aimed at testing the non-equilibrium theory application to grazed arid and semi-arid rangelands.

Burton Smith raised the issue of education. He criticized the attitude (of participants) as virtually everyone agrees that education is good and needed, but having agreed, moves on to discuss other things. He asked how this education is to be done where it is needed; how is it to be funded and by whom; and who is going to dictate what is taught and by whom. He wondered about how to educate those who view the land as something to be mined.

Oyun-Erdene commented that as development proceeds, environmental problems increase. He mentioned that in Mongolia, mining industry activities are destroying land, which is needed for livestock. However, he thinks that development of the mining industry is important to satisfy human needs. He argued that comprehensive environmental, social and economic analysis and assessments are required for existing and projected mining activities. He also suggested that the country should adopt internationally agreed environmental standards.

Pierre Hiernaux raised some interesting questions. Based on the premise that both the grazing systems and the mixed systems frequently coexist and interrelate, he questioned some recommendations given in the multi-donor study, to “stop attempts to regulate stocking rates” and to “promote infrastructures and regulations that facilitate livestock mobility”, as the “non-equilibrium status of the pastoral systems calls for flexibility and mobility”. He assumed that those recommendations imply to keep land tenure systems communal or public. On the other hand, recommendations for mixed systems are oriented to “secure land tenure”, which implies some sort of privatization of the land. He asked how this individual farm tenure could be conciliated with the open access to fodder resources advocated for the pastoralists, as changes in tenure from

the traditional land rights could affect crop-livestock interactions.

Dan Brockington agreed with Pierre and showed his concern that systems that co-exist and interrelate (grazing and mixed systems) are treated so differently in the multidonor study. As to for the chapter's comments on "controlling soil erosion" through "securing land tenure", he stated that he is not aware of many cases where "improvements" in the security of land tenure led to improvements in soil quality. He provides an example of how a supposed improvement in the security of legal tenure brought insecurity of access to resources to the users of the land, apparently without any improvement in soil quality.

Lawrence Tawah commented that Pierre's concerns are similar to the issues he raised in his comments on the keynote address. He thinks that the recommendation given by the authors that governments deregulate stocking rates and facilitate stock movements in the pastoral system is too general.

He cautioned that in situations where dimorphic land tenure practices coexist (a free-for-all system on the one hand and a "secure" system on the other) conflicts are bound to erupt.

The Wageningen group (WG) submitted a long list of remarks on the Grazing Systems chapter. On grazing systems in arid zones, the WG argued that as cattle rely largely on access to water and grazing in the semi-arid regions during the dry season, cattle systems could not be considered within the boundaries of the arid zone. Concerning grazing systems in arid and semi-arid zones, the WG considers that the text is poor in analysis of recent trends. They commented on recent changes in livestock ownership and the preponderance of old and new elites which resulted in the rise of new livestock rearing systems (as opposed to traditional pastoral systems, which are the focus of the analysis), nowadays the main actors of livestock-environment interactions. On semi-arid and sub-humid zones the WG argued that the dominant system is no longer a grazing system for livestock production, but a mixed production system with multiple functions of livestock. They claimed that the importance of the semi-arid areas for the pastoral systems of the arid zone has not been stressed. They argued that in developing

countries livestock farmers share resources among them and with other users. Thus, in respect of better use of the environment, the approach should focus on this shared utilization of resource by diverse users rather than on livestock grazing systems only. The WG argued that in addition to the factors mentioned in the chapter, the population density in sub-humid and humid areas is also low because of low soil fertility for annual crops.

They consider that the encroachment of people in those areas is more a sign of poverty than of taking chances to exploit land with a high economic potential. They argue that current trend is that pastoralists and crop cultivators both become agro-pastoralists; however, as the cultural background of the people is different, they still have to be considered as different groups, especially when the focus is community resource management. About road building in rain forests (mentioned in the chapter as a major cause of deforestation), they claim that no roads through fragile ecologies can mean longer roads, higher investments, maintenance, and users costs and asked who will pay for them. The WG thinks that intensive and extensive grazing systems in temperate environments should be considered separately as they have different characteristics. They finalize their comments by mentioning that in the multi-donor study, the role of livestock for the farmer is oversimplified. On the role of increasing demand as a driving force, the WG thinks that it works mainly near urban centers and roads towards these centers but in other areas, pressures are caused by other factors such as land legislation, population pressure, alternative investment options, and new interest groups.

Ronald Nigh thinks that livestock grazing has been involved in massive losses of biodiversity in the neotropics during the middle decades of this century when livestock was the major motivation for deforestation. However, he argued that livestock is no longer the cause of deforestation, but rather basic food production and plantation crops such as African Palm. He claims that management intensive grazing combined with agroforestry is the key to restoration of degraded neotropical lands and provides income.

Dennis Lapierre, commenting on grazing management made the interesting suggestion that a livestock farmer should think as a grass farmer who uses livestock to manage his/her grazing land.

Miguel Velez expressed his feelings that our discussion is moving in circles. He made a nice summary of some of the contributions and stated that we (scientists) have allowed politicians and economists convince the public that cheap food is possible and rightfully theirs. He commented on the need to educate politicians and the public to help them take an educated decision on environmental issues. He agreed with the idea of scientists being more active in the role of “educators” but thinks that the first task is to convince scientists themselves. He also agrees with the suggestion that we have to link technical, ecological, economic, social and political perspectives in research and teaching. He argued that we have to work with environmentalists because they have the mass audiences and political clout scientists do not have.

Donald Moore, a public educator, sent a comment about education of all sectors of society. He thinks that scientists often lose opportunities to educate society at large because they are not aware of other organizations, which share their interest in educating the public. His comments prompted Peter Scogings to state that he agree with the need for public awareness of grazing lands, as voiced by the authors of the discussion document, Donald Moore, Miguel Velez and others. However, he hesitated to analogize the state of grazing lands to the endangered animal species as done by Donald Moore. He thinks that is extreme. He postulates a public education based on unbiased information coming from objective research rather than emotional arguments.

Donald Moore agreed with these comments. He stressed that his main point is that scientists can gain effective assistance from the organizations discussed in his previous contribution, in order to deliver a message, which should be agreed upon by the majority.

### **2.2.2. The mixed systems group discussion**

This section summarizes the discussions of both the case studies and the corresponding chapter of the multi-donor study.

### **a) Summary of the discussion of the mixed systems case studies**

The first period of group discussions centered on case studies, which provided information about a set of key questions. Participants sent a total of 29 mixed systems' case studies.

The case studies came from the following countries:

Argentina: 1; Australia: 1; Benin: 1; Burundi: 1; Canada: 1  
 Chile: 1; China: 1; Ethiopia: 1; Greece: 1; Honduras/Nicaragua: 2  
 India: 1; Italy: 1; Malawi: 1; Mexico: 2; Nepal: 1; Nigeria: 1  
 Peru: 1; Spain: 1; Switzerland: 1; Tanzania: 2; Tunisia: 1  
 Uruguay: 1; USA: 2; Venezuela: 1; West Africa: 1

The discussion was opened by the comments sent by Miguel Velez. He pointed out that the case studies allowed differentiating two currents of opinion on the driving forces leading to an unbalanced livestock-environment interaction. One set of opinions attributed the problem to faulty technologies whereas the other set was inclined to blame wrong policy. He sided with the second group and stated his belief that the problem with livestock production is not that we do not know how to do it but rather our failure in setting the appropriate policies for a sustainable operation. Ronald Nigh argued that it is unnecessary to oppose these two approaches and then have to take sides. He stated that we have to deal with both aspects as the policies we set influence the technical problems, and vice versa. He pointed out that there is a conflict of interest between those that set, implement and finance policies and the farmers and rural communities that operate production systems. He considers long term societal goal setting as essential to define what technical issues become important to serve those agreed goals.

Stephen Zolvinsky thinks that for developing sustainable policies we do need to find some common ground (he favors the use of a more ecological approach that takes into account many interacting variables) in meeting the diverse interest in environmental issues. Along these lines, Gerhard Nortje supported the notion that the reduction in research funding at present, and to allow industry (whose goals might not be consistent with a holistic societal goals and best interest) to dictate the research portfolio, is very short sighted. David Lidga argued that the driving motivation of food production is profit (difference between costs of production and price) and that environmental issues tend to increase the production costs whereas governments want large amounts of inexpensive food.

He thinks that if the longer-term goal of resource preservation has any non-academic viability, perhaps it should complement food production profitability. Vernon Anderson attributed to government goals of securing cheap food the existence of governments programs which promote the mining of resources, as margins are too narrow to chance newer sustainable production systems.

Discussing some environmental production methods, David Ligda asked whether consumers are willing to pay a higher price for products coming from these methods. Guillermo Schnitman suggested that we have to prepare the market to support the internalized costs of a positive environmental program, through a persistent communication effort. On describing the characteristics of successful environmental operations, Burton Smith commented that the knowledge and technology is available but public awareness or will seem to be lacking.

A short discussion on the relationship between poverty and lack of education and degradation arose in response to comments from Uslam Pervez Umrani. He argued that back in history, "poor and uneducated" people in the Amazon Forests, Africa and Asia did not cause any major disturbance to the environment. Burton Smith responded that these "poor and uneducated" people did in fact cause a lot of environmental problems including species extinction and over-exploitation of their resource base. He also questioned that those people were, based on the standards of the day, that poor or

that uneducated, as they made their living off the land and were quite knowledgeable about their environment. Somehow related, Gerhard Nortje argued before that, whether the traditional practice of keeping animals (any traditional practice perhaps?) should be encouraged, is not the question to be asked. He claimed that we should rather ask what is required to economically empower the disadvantage (currently poor and uneducated?) rural farmer and city dweller. It is very interesting to notice (if you allow the moderator to express his opinion) that one of the case studies (Juan Ladron de Guevara's contribution) pointed out the low opportunities for education and cultural advancement of rural people as a negative driving force affecting livestock-environment interactions.

## **b) Summary of the discussion of the mixed systems chapter**

The second period of group discussions in this room focused on the mixed systems chapter of the multi-donor study on Livestock and the Environment.

This discussion period considered two central aspects of the chapter: the characterization of hot spots and driving forces on the one hand and the recommendations on the other. This report summarizes the comments and contributions on both the diagnostic and the recommendations aspects of the chapter.

Bob Hart, stepping out of his role as a conference manager and wearing the agronomist's hat, made a few comments about "hot spots". He pointed out that the concept of a hot spot (as an area where a system is causing a type of environmental degradation) is different for mixed systems as compared to grazing systems. He argued that for grazing systems we can point to focalized areas where soil and local vegetation is impacted directly by livestock, whereas for mixed systems the hot spot is anywhere where there is a breakdown in the integration between crops and livestock, impacts not being directly caused by livestock. Rather, impacts such as animal waste pollution or soil degradation due to nutrient deficits are caused by the breakdown of linkages between crops and livestock.

Raul Vera commented that an important number of assertions made in the chapter lack supporting documentation. With respect to policy requirements in relation to nutrient deficient mixed systems in the developing world, he thinks that the analysis provided is too succinct given the importance assigned to policy, vis a vis technology, in the discussions of this conference. He argued that one policy dimension not considered in the chapter is education, both in its wider connotation and education referred to the basic functions and functioning of agroecosystems.

In a crucial contribution, Pierre Hiernaux argued that the separation (the multidonor study presented livestock systems as discrete entities) between grazing and mixed systems is not very appropriate in the Sahel because most of the farmers own and manage livestock and most of the herders are involved in some cropping activities, thus both systems coexist and are closely linked. Moreover, he argued that the Sahelian mixed system cannot be considered as a closed system, at least not as far as livestock is concerned, nor at the "farm" scale. He claimed that although livestock is often blamed for land degradation, in South Sahel cropping activities have a major influence on soil erosion. He disagrees with the emphasis given in the document to the nutrient and energy equilibrium through crop-livestock integration and the role of livestock in maintaining soil fertility. He provided evidence showing that nutrients returned (to the soil) by livestock amounted to less than 5% of the nutrient exports in grain, this return causing a positive nutrient balance in less than 5% of the cropped area. He raised the question whether equilibrium is possible without external fertilizer inputs.

Juan Marini Neyra asked how could we maintain biodiversity in the context of monocropping. Answering the question, Burton Smith suggested the use of shelterbelts, crop rotations, fencerows, waterway sides, roadsides, and intercropping.

Miguel Velez posted an interesting "political manifest" which was not out of order at all. Based on his strong feeling that we already know a good deal about the causes of problems as well as about the solutions, he asked what hinders the application of what we know. He believes that researchers are responsible for what they research and for the use of what they develop, but very often they have left the application to others. He

does not believe most stakeholders have to accept what politicians are trying to impose them on behalf and for the benefit of a few. He pointed out that the frequently invoked "global market forces" are not natural forces beyond our control but man made rules which we can modify.

R.O. Wheeler posted his comments on policy, research and sustainability. He began by asking some relevant questions about what the expected results of the conference are in terms of either a research or policy agenda, the political and research bodies targeted to receive the recommendations, and the way of arriving at the implementation of the agreed agendas. On sustainability, he argued that to hold that resources must be sustained into an infinite time frame of use is not defensible. He supported the idea that a resource should be used up if its present value of use is greater than the discounted value of future use. Burton Smith strongly disagreed with Wheeler's assertions. He argued that world's policy makers have a distorted paradigm concerning natural resources, which is based on current economic theory that gives natural resources no value other than the cost of extracting them. Burton suggests that environmental problems are attributable to this paradigm, which prioritize the maximization of short-term profits and regards all economic growth as good.

Piet Leegwater posted a summary of comments by the Wageningen Group (WG) on different sections of the Mixed Systems chapter. On policy pressures and options, the WG thinks that a more clear distinction should be made between the different policy instruments: Price policies and subsidies on the one hand, and norms, rules and regulations on the other. They agree that a free market may enhance a quicker response to a growing demand for animal products but they don't see how this will lead to more environmental balanced livestock production, as the study suggests. They claimed that as long as environmental costs have not been internalized in production costs, measures regarding subsidies/taxes on inputs and products can not be expected to have a direct positive impact on the environment. They think that norms that consider direct relationships of livestock with the environment will increase production costs and producers will oppose. Therefore they have to be imposed by government with the

support from society. They claim that control over livestock-environment interactions will require not less but different and more government involvement through the way of standards and regulations limiting the freedom of operation by private producers.

Piet Leegwater also commented on animal traction in mixed systems. He argued that animal traction as a means of increasing labor productivity and mechanization in agriculture will accelerate soil mining, degrade the environment and force migration to new land. However, he pointed out that it is the cash crops and not the animal the responsible for soil fertility depletion. He thinks that it is unrealistic to expect livestock to be able to provide enough plant nutrients through manure, particularly in a cash crop situation. On oxen versus donkeys in Africa, Piet claims that farmers prefer oxen over donkeys because returns on invested capital in oxen are in the order of 20%, representing 40-60% of overall benefit from animal traction, whereas donkeys hardly increase in value. On oxen versus cows, Piet argues that cows cannot compete with oxen because cows for traction require more management and improved feeding. One of the objectives of a cow traction project is to reduce livestock density. Piet claims that lack of alternative investment opportunities for farmers is a more important determinant of livestock densities than production technology. In his view, when political instability and lack of farmers' participation in local resource management prevail then it is doubtful whether new technologies can prevent a further mining of natural resources, certainly not technologies in animal traction.

Mohammad Jabbar commented Burton Smith's response to Donald Moore and derived from it a great need for communication between biophysical and social scientists for understanding the issues and problems, generation of technologies, and formulation of policies and strategies to overcome problems. He argued that greater communication among disciplines is required for two reasons: (1) to understand environmental problems in a holistic context, which is likely to lead to a better understanding and a better solution; and (2) to generate technologies and policies that have a potential for adoption and will not end up in shelf. To this end, user perspectives (socioeconomic studies) should be incorporated in the research process. Mohammad argues that both

the causes of degradation and the role of livestock in degradation/conservation are complex, with a lot of local variation, thus a multidisciplinary approach will allow us to draw a better picture of problems and solutions.

### **2.2.3. The industrial systems group discussion**

This section summarizes the discussions about the industrial production systems issues, arising from both the case studies and the corresponding chapter of the multi-donor study

#### **a) Summary of the discussion of the case studies**

The first period of the group discussions centered on case studies, which provided information about a set of key questions. Participants sent a total of 7 industrial systems' case studies.

The case studies came from the following countries:

Canada: 1; Dominican Republic: 1; Greece: 1; The Netherlands: 1

Pakistan: 1; USA: 1; World: 1

Discussions in this group were rather less active than in the grazing and mix systems rooms as only seven people participated in the exchange. However, some important issues arose. Thus, Aslam Pervez Umrani pointed out the big difference between developed and developing countries as developing countries give less importance to environmental issues than developed countries. He attributed it to differences in the rate of population growth. He also questioned the rationale of monogastric livestock production in a country like Pakistan, which faces severe shortages of cereals for human consumption. He also showed his concern about the problem of water pollution

caused by existing practices and the risks associated to unrestricted use of antibiotics as feed additives.

Thomas Sauer expressed his optimism concerning the future of industrial systems in a sustained environment-human well-being balanced situation. However, he thinks that most environmental effects of industrial systems are not ready visible. Compounding the problem, there are irresponsible operators and lack of concern from citizens who may view any effect as only the price of doing business. He declared that as a full-time researcher, he is coming to the uncomfortable conclusion that viable (technological) solutions to most environmental problems already exist. He argued that what is limiting is society's commitment to take the necessary steps and that we need to educate citizens with the will to incur the necessary costs of protecting natural resources.

David Ligda asked whether consumers would accept the internalized costs of any positive environmental positive effects achieved with improved technology. For Thomas Sauer the challenge is, precisely, how to convince citizens that animal production needs to be structured and regulated so as to protect natural resources while some of the associated costs will increase food prices. Michel Bigras-Poulin suggested than considering the environment as strictly the physical environment underestimates that the environment is both human and physical. He considers than the inclusion of human aspects in the evaluation of a pollution problem is very important if an adequate and equilibrated long-term solution is to be found.

## **b) Summary of the discussion of the industrial systems chapter**

The second period of group discussions in this room focused on the industrial systems chapter of the multi-donor study on Livestock and the Environment.

This discussion period considered two central aspects of the chapter: the characterization of hot spots and driving forces on the one hand and the recommendations on the other. This report summarizes the comments and contributions on both the diagnostic and the recommendations aspects of the chapter.

Rosario Perez Espejo posted her comments about industrial systems in Mexico. She pointed out that quality and nutritional value of industrialized pork products are low due to high fat and nitrate content. This pork industry strongly contributes to water pollution. Rosario commented on the importance of pig rearing in small rural households and the presence of diseases such as cisticercosis and taeniosis, which affect humans. Rosario's contribution called our attention to the important aspects of food quality and sanitary condition as critical components of the human environment. Burton Smith commented that education plays a role in solving environmental problems. However, he asked how to educate people when they don't want education, particularly when it attempts to counter people's culture. Thomas Sauer commented that there has been a lot of discussion on policy and argued that very few scientists have any input on policy decisions. He thinks that scientist should be consulted by decision-makers but they are not. He suggests that scientists need to be organized and actively pursue and educate policy makers.

Prompted by Thomas Sauer comments, Allan Kean argued that trying to drive good nutrient management and resource protection via convincing the majority of citizens that industrial livestock systems must be regulated should not be our primary focus. He considers instead that our focus should be on how to provide definitive resource protection requirements that are understandable, feasible and timely, as operators are more interested in knowing exactly what will satisfy regulators than taking time to fight about being regulated.

#### **2.2.4. The cross-systems group discussion**

This section summarizes the discussions about the cross systems issues, arising from both the case studies and the corresponding chapter of the multi-donor study. It is important to notice that participation in this group was almost none.

### **a) Summary of the discussion of the case studies**

Participants in this group received all case studies.

Shan Panigrahi initiated the discussion by claiming that methane emissions by grazing animals fed on low quality roughage are a major reason for refocusing livestock development strategies under grazing systems. Arguing that pastoral systems are unsustainable, he wrote that unless those systems are intensified (reducing methane emissions), grazing land will increasingly be converted into cropland because that will be more sustainable, both environmentally and economically than pure grazing systems. Burton Smith took exception to the above statement, pointing out that land so worn out that it can't support grazing livestock won't be able to support crops. He asserted that usually the scenario is the reverse. Guillermo Schnitman claimed that environmental problems related to agricultural systems still are a matter of debate. He pointed out that in certain ecoregions, livestock is perceived as a cause of degradation whereas in other regions well managed animals are seen as a means to stop and revert degradation.

### **b) Summary of the discussion of the cross systems chapter**

The second period of group discussions in this room focused on the cross systems chapter of the multi-donor study on Livestock and the Environment.

This discussion period considered two central aspects of the chapter: the characterization of hot spots and driving forces on the one hand and the recommendations on the other. This report summarizes the comments and contributions on both the diagnostic and the recommendations aspects of the chapter.

Aslam Pervez Umrani agreed with Bob Hart's assertion that the breakdown of the integration between livestock and crops increases the problem of nutrient balance in the soil. He also agrees with the author's comment that improvements in ruminant

nutrition can reduce methane emissions. However, he doesn't see clearly how to introduce such improvements in arid and semi arid ecosystems. On sustainability, he argued that there are very few options to use fertilizers to maintain soil productivity in developing countries but maintaining soil productivity is a requirement.

Pierre Hiernaux commented on some of the issues raised in the Cross-Systems Chapter. On impact of concentrate feed production on land and water quality, he discussed some other factors, further to the factors listed by the authors, prompting the use of concentrates in livestock production. Among these factors he listed the cases where population pressure on land restricts extensive livestock production, where feed conversion to animal product is high, or where the ratio of livestock product to feed price is relatively high. In agreement with the author's proposal to ". limit feed use and corresponding land requirements" he suggests an increased use of crop residues and the inclusion of legume forages as ways to minimize the negative environmental impact of concentrate feed production but cautioned that in developing countries, farmer uptake of these technologies have been minimal. He thinks necessary to dilucidate the cultural, socioeconomic and policy factors limiting technology adoption, which has been insufficiently or secondarily investigated. He argued that there are opportunities in developing countries to optimize the use of concentrates and non-concentrate feeds to promote socially and economically acceptable and environmentally benign livestock production practices but a concerted effort at both local and international levels are needed. He stressed the complementary role of both research and policies to exploit these opportunities.

Piet Leegwater raised again the issue of the internalization of environmental costs and the willingness of consumers to pay more for "environmentally safe" livestock products. He argued that without internalizing environmental costs in the livestock sector as a whole there is no reason to expect that recognition of eco standards and eco farming will lead to more environmental balanced intensive production systems. However, Piet suggests that norms and regulations directly focusing at livestock environment interactions are more effective than proposals to internalize environmental costs.

### **2.3. The final plenary discussion**

The plenary discussions covered the last three weeks of the electronic conference and focused on a final analysis oriented to produce the main conclusions and recommendations of the conference. These conclusions and recommendations complemented the analysis provided by the local non-electronic consultations to arrive to an integrated set of recommendations intended to be submitted by the conference organizers to the global meeting at the Netherlands.

Burton Smith argued that by almost any case of degradation there are concomitant examples of successful restoration. He contended that along successful restoration examples based on high inputs in terms of money, capital, equipment and technical knowledge, there are low input successes out there. He proposes that a search for these successes be undertaken and that this search be primarily directed towards those on the land, rather than institutions. He pointed out that those conducting the search would have to be cognizant of holistic concepts, have an understanding of dynamic systems, know degradation when they see it, and have practical experience in managing an agricultural system. The objective will be that of education and the dissemination of information about those successful examples, which are based on the application of basic knowledge.

Jan Slingenberg pointed out that accommodating and safeguarding the complexity of interactions present in livestock agriculture demands a much more composite picture than is yet available and it is this paucity of information plus the associated incomplete comprehension that should now be addressed by a multidisciplinary effort. He suggested that a virtual partnership framework is drawn up along the lines earlier on suggested by Bob Hart (Bob has briefly mentioned his brainchild) that will involve all the relevant international agencies, NGOs, NARS, Universities and business. As a first activity of this web he suggested the "Monitoring of the animal production driven transformation of the global landscape" to see how the ongoing course of events

interferes with development in general and food security, resource degradation, income distribution and health in particular. Raul Vera expressed his full support for the idea of exploring the constitution of a virtual center on livestock and the environment. Miguel Velez who expressed his willingness to formally endorse it by writing to possible donors also supported Bob's idea.

E.R. Orskow commented on methane production from ruminants and showed his concern about the research attempt to reduce methane production and the argument that with higher levels of production methane production per unit of animal product is reduced. He considers it to be a false premise as in many countries the higher production is achieved by feeding grain or other supplements which could be fed to non ruminants with no methane production at all. He does not expect it to happen and feels that using scarce research resources for the purpose of reducing methane production from ruminants is rather futile as long as there are more important aspects on livestock environment interactions to address. His recommendation to research funding organizations is that no action on methane production by ruminants is taken until much more pressing problems have been solved.

Miguel Velez posted a number of recommendations to address some critical issues. He sees the adoption of technology as a problem, which creates the need of multidisciplinary analysis. He thinks that better feeding would allow improved, more efficient breeds, which mean less maintenance costs and apparently less pollution. However, he asks where is the balance between production and impact on the environment. He commented that although pig and poultry are more efficient feed converters, the costs of producing grain are higher than those of producing grass. Thus he recommend to search for feeding alternatives like sow grazing and the use of sugar instead of corn. He argued that education of the public and study of policies is required. He thinks that environmental standards to avoid pollution should be internationally agreed. He showed his concern that few research institutions are left in Central America as CATIE closed livestock facilities (Comment from the moderator: a grossly wrong decision I would like to add) and CIAT is retrenching. Only Zamorano is left with

resources for research and training in production and socioeconomic aspects.

Based on the hypothesis that policies frequently have more importance than technology regarding the evolution of farming systems and land use, Raul Vera recommended that farmers organizations and R&D institutions interact regularly with local policy-making bodies. He also thinks that R&D institutions need to get closer to farmer organizations and that the emergence of Ministries of the Environment and increasing number of environmental NGOs implies that the livestock sector will have to establish a constructive dialog with these new actors.

Silvia Inciong recommended a public awareness campaign on livestock and environmental issues conducted by information disseminators (media, extension workers); elementary and high school teachers and local government officials to disseminate basic information.

T.R. Preston endorsed the idea that State managed agricultural teaching, research and extension in developing countries does not work and that empowerment should be given to grassroots organizations. He suggests that funding agencies should be encouraged to channel funds to those institutions which are researching, developing extension messages and creating "opportunities for learning" for the promotion of farming systems in which the role of livestock is beneficial to both the environment and human needs. He proposes that research, extension and learning should be integrated in the same way as the farmer integrates these activities. He argues that international agencies should not fund agribusiness and intensive livestock factory farming. He suggests to make it illegal to export manure, to reinforce the pressures caused by manure disposal as a feedback mechanism to empower local people to force changes in national and regional livestock support policy. He thinks necessary to create opportunities for more appropriate learning and supports the idea that scientists should be trained in their own environment and not in industrialized countries. Another Preston's recommendation is to democratize and extend electronic communication.

Emmanuel Mwendera accepted the premise that there are a number of environmental problems associated with livestock in many places. However, he thinks that there are a

lot of opportunities for strategies to enhance positive and limit the adverse effects of livestock on the environment. He recommends that Ministries of Agriculture and Environment should conduct consultation with rural people and farmers to access societal perception on the issues related to livestock and environment. He hoped that rural people would be sensitized to the implications of maintaining old traditions, which are not in line with current situations. He considers important that policies should not only protect the environment but encourage more productive ways of managing livestock as any attempt to minimize livestock impact on the environment are bound to be futile if farmers do not have better economic alternatives.

Aslam Pervez Umrani put forward a research proposal for arid rangelands in Pakistan as he thinks that there is still a paucity of information about principles to be applied in the formulation of policies for the management of such areas. In another contribution, Aslam Pervez Umrani reacted to Preston's comments and recommended an appropriate training for operators in developing countries. He proposes that students going to industrial countries should be directed to universities located in similar ecoregions as their provenance and follow a split-training program which should include a period of research at home.

Based on his perceptions about the main issues and preliminary conclusions arising from the conference, Lawrence proposed a set of activities oriented to gather and analyze information. He proposed to divide the globe along continental lines; delineate areas within major geographical divisions where we already know about livestock and environment interactions; map out strategies for gathering information where nothing at all is known; conduct surveys and studies to determine the major causes of environmental degradation vis-à-vis the system in place; and, collate, analyze and publicize the results. He proposed an interactive participation of international centers, NARs and local organizations.

Mihail Dumitru commented that in Romania there two major actors affecting the balancing of livestock, environment and human needs: the Government and farmers. He pointed out that Romania is in a period of transition from a centralized economy into

a market economy. Therefore, the involvement of the State is still useful, as the level of knowledge, training and awareness of the people regarding environmental problems is very low. He proposed a number of actions to be taken by both actors, oriented to develop and promote the adoption of measures for environmental protection as a component of animal husbandry.

Oyun-Erdene pointed out that while people are the main agents of resources degradation, they are also the victims. He put forward a set of recommendations including the following: a more concerted work of institutions involved; development of indicators of sustainable livestock production; adoption of a global declaration on balancing livestock, environment and human needs, to be incorporated in national policies and legislation; implementation of international projects on preventing resource degradation at regional level; reforestation and aforestation activities in arid and semi-arid areas of the world; regionally coordinated establishment of green belts; promotion of the environmental responsibility of indigenous peoples; encouragement of the exchange of ideas, data and staff; promotion of shared research on land rehabilitation between countries; training for the prevention of land degradation; and, establishment of a Regional Center for the prevention of land degradation.

Manuel Ruiz submitted a number of recommendations. The first one referred to livestock development policy-making for which Manuel considers that the participation of grassroots organizations should be ensured. He thinks that policy making should be based on a consciousness-raising effort that will help developing countries identify where their competitive advantages are in terms of livestock production vis-à-vis the environment, to what degree they can provide the required food for their people and what strategies should be followed. He proposed that future funding of livestock projects should be tied with the condition that they deal with concomitant environmental effects and policy analysis and design. His second recommendation dealt with bridging the gap between the technical people, producers and policy makers as he argued that in Latin America policies are often designed by economists and environmentalists without a holistic analysis of the problems they intend to solve and without the

contribution of any technical argumentation by other interest groups. He suggests this as an area that should receive attention in international cooperation programs by way of mechanisms such as “translation” of validated technical information for policy makers’ understanding and some other mechanisms. Manuel’s third recommendation is about reforming education; he pointed out that in Latin America university academic programs have changed very little in the last 30 years or so and that there is a profound need to develop academic programs that incorporate issues such as sustainability, natural resource protection, gender in the rural context, and knowledge generated by local research. Further, as education takes many forms, farmer’s organizations could play a leading role in rural training and farmers could participate in university-farmer programs. Finally, Manuel recommends refocusing research. Repetitive research could be avoided by improving the gathering, evaluation, analysis, rationalization and organization of available information, coming from different sources such as journals, books, technical reports, project reports and ancient technology. He argues that research efforts should be based on the analysis of the agricultural potential, the environmental vulnerability, and the socioeconomic context of each of the major ecosystems where livestock is produced.

Rosario Perez Espejo submitted her recommendations for research, training, technology adoption, incentives, and monitoring for the Mexican pig industry. On research, she asked for site specific technology concerning the use of wastewater from pig farms in agriculture. On training, she recommends permanent programs on environmental regulations, technical information, fiscal sanctions, etc., to all actors related to industrial livestock production. Concerning incentives, Rosario recommends that pig farms without facilities for wastewater management should receive subsidies or financial incentives for transporting pretreated wastewater to agricultural areas. Also, financial incentives for companies interested in the production of organic fertilizers can help to substitute chemical fertilizers by organic ones. On monitoring, Rosario suggested the formation of “water watchers”, local committees integrated by producers, consumers, environmental advocates, researchers and other citizens, to help producers and authorities to apply and enforce regulations.

In a further contribution, E.R. Orskov agreed with T. Preston's comments and recommended that organizations that encourage developing countries researchers to work on their own local problems be encouraged and supported. He argued that there is a need for more holistic or system oriented research work where livestock and their products are seen in their positive interactions with soil and plants. Commenting on T. Preston assertion that there is no need for animal cloning, E.R. Orskov added that there is no need for more homogeneity in animals either. He recommends stopping or control import and export of so called exotic improved upgraded animals into areas where quality of feed resources and climate is not matching the potential of them.

Shan Panigrahi disputed Preston's assertion that scientists from developing countries should be trained in their own environment and not in industrialized countries. Panigrahi argues that education and training have long term developmental goals not short term ones and that basic training (in developed countries) puts scientists in a strong position later on in their careers in their countries (once they have come down to earth, he added) to being able to tackle agricultural problems. He pointed out that developing countries require their graduates to be exposed to the highest level of scientific education and approaches necessary to tackle agricultural problems through research. On practical grounds, Panigrahi also disagreed with the idea of a split postgraduate training (research at home) proposed by Aslam Pervez Umrani, arguing that local supervision and facilities will be unsatisfactory. On the question of why overseas students have to pay 10 times more than local students, he regarded it as a "moral/ethical" issue. To tackle the problem of making research more appropriate to local situations in developing countries, Panigrahi suggested that more Post-Doctoral Research Fellowships be funded by international agencies that are based within the type of learning institutions suggested by T. Preston.

To the moderator's observation that policies, education and research have arisen as main issues in this conference, Peter Scogings added that the issues include the role of researchers in educating both the public and the policy-makers. On training and education of developing countries scientists, he disagreed with T. Preston. P. Scogings

considers that scientists from developing countries need to be exposed to other research cultures and they should not be precluded from other experiences, as basic knowledge is essential for problem solving. He argues that the real challenge is to find ways of using the theoretical knowledge to solve problems through applied research. He agrees with several comments about the need for researchers, farmers and policy-makers to interact more with each other and the need for multidisciplinary analysis and exchange of ideas. However, he pointed out that it is not only collaboration and communication among researchers, developers, farmers, politicians and others that is called for, but also integration within these groups. He cautioned against duplication of efforts as he noted that many proposals aimed at monitoring, understanding and modeling livestock production systems are similar to some existing projects and programs. He suggested keeping the LxE list going as a news/discussion group.

Ariff Omar called our attention to the fact that many institutions of higher learning in developing countries have developed adequate facilities to provide post-graduate training in tropical animal agriculture. He suggests that researchers from developed countries should be encouraged to spend time at those institutions to strengthen their capabilities and to foster the interaction among scientists of different background. He also suggests that students from developing countries should consider those institutions as providers of quality post-graduate training.

Kofi Anani made several recommendations geared towards policy focus in West African countries. Based on the premise that livestock production in West Africa generally occurs in traditional rural communities, he proposes a knowledge-based system, which takes into account the psychosocial composition and the cultural psyche of rural dwellers, and understands indigenous agriculture management principles. On education, he thinks that action is needed to restructure the contents, goals and objectives of the educational system, which alienate the young from agriculture and their cultural heritage. He argues that policy action is required to rebuild Africa's modern institutions on the indigenous forms of mobilization and organization of rural communities to ensure that natural resources are managed in the manner that reflects

the reality of nature and creation within the rural agricultural economy. He recommends the reformulation of current strategy of surplus management, which is dominated by transnational agribusiness interests and affected by advanced countries' government subsidies. He considers that under the current market arrangements, developing countries are compelled to turn arable land and forests into the production of raw materials to the neglect of internal food production, which creates the need to import surpluses from developed countries. In Anani's view, a Global Dialogue regarding the logic of international development theory is necessary.

Alex Koutsouris commented that some key issues were not thoroughly examined. He feels that human needs have received the least attention during the conference. He discussed the definition, nature and diversity of needs as he believes people should have such concepts in mind when dealing with policy-makers, researchers, educators, farmers and other actors, who may come from varying political, ideological and cultural backgrounds. The second issue he discussed is the continuum research-extension-farmer, of which he considers much attention has been given to research and less to the other partners. Moreover, he argues that on-farm research with farmer participation was not given the attention it deserves. He discussed some implications of FSR/D, which some times leaves apart socio-cultural aspects. Another issue he discussed is education, which he considers that up to now results in a way of thinking and acting closely related to the dominant productivist model of agricultural and rural development, which is challenged by eco-development and livelihood-sustainability considerations. He argued that researchers-extensionists-agronomists require new kinds of skills and qualities such as a capacity to integrate knowledge and information from different perspectives and disciplines in both natural and social sciences. On policy, he thinks that there is confusion on how policies are put forward as the idea arises that the states should do "this and that." He asked which is the process of effective consciousness-raising and empowerment of grassroots organizations within such a framework?.

J.C. Wandenberg recommended a truly participative decision making process to decide what to do and when to act, by all those that have the desire and ability

(opportunity and resources) to progress, along with those who may have the desire but not the ability to do so.

Ariff Omar sent another contribution arguing that a global perspective on food supply and demand and the realization of WTO agreements have to be made aware among national leaders.

Peter Scogings disputed Monte Bell's statement that "the Holistic Management Model is an excellent and practical aid to goal driven decision making" by questioning the capacity of the model to work in any situation other than the system where it was developed and for the purposes for which it was developed. Peter considers that making such statements is socially and ecologically irresponsible.

Maryam Niamir-Fuller commented that the "actions" listed by participants are all externally induced changes which give little recognition to the fact that the primary actors (farmers, pastoralists, etc.) very often are led by their own internal dynamics. She considers that the list reads like one out of the 1960's with too much focus on development as primary a means of "change" rather than as a means of securing sustainable livelihoods. She recommended two specific actions: 1) assisting the adaptation of systems to new constraints by changing the system or, conversely, changing the external forces; 2) facilitating internal experimentation and development of solutions. Maryam also commented on the previous non-equilibrium theory debate, as she perceived a tendency by some participants to create a "white elephant" out of the theory, in order to be able to shoot it down later, and concluded that it is important to refrain from misrepresenting a theory.

Daniel Dehareng shared some thoughts about some of the above recommendations and comments. He gave full support to the idea of a virtual livestock and environment center. However, he thinks this is not enough and recommends the inclusion of the virtual center in a supra-structure, a "Virtual Worldwide L-E Network" which should connect all actors implied in the process. Besides linking all actors in an effective multidisciplinary way, Daniel proposes that the center be responsible for the constitution of common data banks and for the dissemination of information. He also supported

Preston's recommendations but questioned some of his assertions, such as the one concerned with the allocation of funds for research and training. He supported the idea of encouraging "problem-solving" research but asked whether the more fundamental research should be discarded.

The ILRI team in Niger (Salvador Fernandez-Rivera, Pierre Hiernaux and Timothy O. Williams) sent his recommendations for the Sahel in south-Saharan West Africa. They suggest to promote empowerment of rural communities on natural resource management, particularly for pastoral and forest resources, based on the knowledge of the existing use rights of all groups and a participatory, community-based approach. They also suggest promoting a regional stratification of livestock production and facilitating regional trade in livestock and animal products by way of bilateral and multilateral trade agreements, improvement of trade policies and regional marketing infrastructure. A third recommendation is to promote livestock local and regional mobility by way of contractual agreements between stakeholders, invest in basic infrastructures and impact studies. Another recommendation is to test alternative livestock management practices for efficient organic matter and nutrient cycling, including spatial transfer, losses and risks of pollution. Also to test alternative grazing systems on sahelian vegetation and soils. Finally, they recommend determining the role of fodder shrubs and trees in animal production and nutrient cycling.

Miguel Velez sent another contribution with a reminder about the urgency of rethinking the whole food production process as both large-scale production and small farmers, driven by economic forces, are hardly an example of sustainability. He argues that discussions about technological research, who does it and where to train scientists will not solve the problems. He also asked whether global warming is something we have to consider and how can we prepare for it.

Based on several premises such as the impossibility of solving livestock-environmental problems without simultaneously solving problems of water, soil, economics, human and animal diseases, transportation, community health, etc. by way of participatory research methods set into a systems context, David Waltner-Toews recommended that

donors fund regional centers for rural/agricultural development. He envisions that such centers (he named CG centers as candidates) should include programs for doing multi-criteria diagnostics on agricultural systems, participatory methods, coupled “hard”, “complex” and “soft” systems methodologies.

The CRIPAS group, from Universidad Nacional de Costa Rica, sent a proposal for the reinforcement of local knowledge and information systems supported by information technology as a strategy for sustainable livestock development. They recommend decentralized application of farm monitoring and analysis systems to improve farm resource utilization and generate information on sustainability, productivity, profitability and health aspects. Research, extension and policy-makers will benefit because high quality data will be available to assist their programs and policies.

Cees de Haan made some comments and put forward a few questions. As the virtual center appears as one of the main follow-up recommendations, he asked for more specific details on products, mechanisms of stakeholders’ involvement, focus and the ways of influencing policy makers. Noticing that the conference is low on environmentalists, he asked how to build bridges with that community and how the dialogue can be managed. On several recommendations focusing on the need for further education, data collection and research, which are long-term activities, Cees asked whether we could wait till the results are in before taking management measures in particular ecosystems. Concerning international agreements on environmental standards and internalizing environmental costs, which will contribute to increased food prices, he asked if that increase is feasible and appropriate in developing countries or else some degradation of their natural resources are required for them to be able to built up their human capital through adequate nutrition. His last question concerns the criticism on the conference on the industrial system. He asked if the background paper is wrong in having a positive view of this system. He also asked if there is proof that the other systems can supply the increases in demand expected over the next decades.

As mentioned by Cees de Haan, the establishment of a Virtual LxE Center seems to be an idea supported by a number of participants in the conference. At the request of

Henning Steinfeld and his colleagues at FAO, Bob Hart described several options of electronic communications-based initiatives. He submitted four options, varying in cost and complexity. His fourth option, which is the most complex, is the Virtual LxE Center proper. The other three are described as an ad-hoc inter-institutional cooperation, an independent electronic forum, and a LxE Network with supporting e-services. He pointed out that the institutions involved in the discussion of possible future initiatives are willing to consider these options and they would like to know the opinions coming from this conference.

Miguel Velez argued that there is a forgotten actor in this conference as much has been said about technical matters but little about the farmer/pastoralist. He contends that society has to consider him as a manager of the environment, who deserves decent pay and to live decently. He asked how much money farmer's deserve, how much land and animals do they need to obtain that income, and who will pay for it. Don Peden and Nadine Saad introduced another forgotten actor, namely women. Don and Nadine were very interested in hearing views on the role of women in the described livestock systems and asked how women are affected by livestock-human-environment imbalances. They also asked how women would/should be affected by the interventions proposed in this conference.

David Waltner-Toews responded Cees de Haan specific question about involving stakeholders and policy makers by arguing that this frequently asked question betrays a lack of understanding of the new systems-based interactive research methods. In this approach, all stakeholders (including farmers and policy-makers) are part of the research process which requires definition of key levels (local, region, country...) and important stakeholders.

Rosario Perez Espejo mentioned a relatively successful project carried out in Mexico to minimize the impact of wastewater from pig farms. It involved collaboration between the academic, private and public sectors. She recommended similar initiatives to produce guidelines for waste management, design projects for the production of organic fertilizers, educate stakeholders and integrate different interest groups to monitor

regulations compliance. She also commented on the lack of resources for government-run extension services in developing countries.

Raul Vera responded to some of the important issues raised by Cees de Haan. On how to influence policy makers, Raul recommends that international lending agencies host a series of regional high level, well focused regional face-to-face workshops with national policy makers and international environmental organizations. Complementary, for the national and sub-national level, he recommends the implementation of joint research projects. On building bridges, besides the above activities he recommends that all participants in this conference should take the initiative to build bridges between producers' organizations and the environmental sectors. Concerning the urgency of action, Raul feels that we have to be pragmatic and need, not only to ask for more research funds but to delve into the current stock of knowledge which is large and may be seriously underutilized, without being used to inform policymakers who continue to take uninformed decisions.

Responding to Bob's suggested options, Gregory Sullivan supported option 1 (minimum approach; ad hoc cooperation) as an immediate linear approach to sustaining the efforts made by participants to this conference, complementing this initial action with the development of more complex networking.

Jan Slingenbergh argued that the main issue is the unchecked growth of livestock production in developing countries, associated with issues such as food security, poverty and emerging diseases in both livestock and humans.

Don Moore recommends an integrated approach to experimentation and database management on similar biotic communities across continents, to test alternative hypothesis of both agricultural and environmental scientists. He also recommends education of people at large, including all stakeholders and social actors in order to integrate the needs of farmers and rural people with concerns of other public. He stressed the need to make scientific information available for decision-making. Several mechanisms and levels of education are suggested. On Bob's submitted options for networking, Don supported the idea of a virtual center with programs based at current

active institutions.

Miguel Velez responded to de Haan's questions. On the virtual center issue, he thinks that it will bring people from different disciplines together. On building bridges he suggests to invite representatives from the major environmental groups to the Wageningen meeting. On food prices, Miguel argues that as in poor countries farmers represent a large proportion of the population, higher food prices would mean better incomes for them. On industrial systems he agrees that these systems provide the food but he questioned the costs to environment and society.

Mohamed Saleem made some comments and raised some questions. He argued that there are several issues that need to be addressed before actions can be prescribed. On human needs he thinks we have to clarify whose needs and what needs are we talking about. He argues that livestock problems can also be addressed from another angle as livestock are second level converters of solar energy and research and development could be more concentrated to improve productivity of the better land in the lower or moderate slopes so that human grain requirements can be met and steeper slopes can be spared to ease grazing pressures and the resultant land degradation. He referred to a recent international workshop where soil fertility recapitalization was considered as a high priority issue. He asked about the possibility of recapitalization of grazing lands arguing that grazing lands be considered natural assets as croplands are. Commenting Cees de Haan's question about how long do we have to wait (for research results) to take actions, Mohamed (who recalled the same question was raised by Cees some fifteen years ago) argues that there is a flaw in our approach to the problem and that research and development efforts need to be re-examined. He supports, in principle, the idea of a virtual LxE center. However, he is concerned with the technicalities and the benefits for the less developed countries. He put forward an idea to give priests of every religion an active role for conveying (to regular church, mosque and synagogue goers) the message of balancing agriculture, environment and human needs.

Christiane Willeke-Wetstein discussed some criteria for deciding which one of Bob's

options to choose. Proposed criteria included:

1) Cooperation between all stakeholders in order to find the best solution for each location; 2) Local definition of environmental quality objectives such as threshold values for pollution and degradation, agreed upon by all stakeholders; 3) Securing easy access to information; 4) Actions should start now; 5) Use of existing infrastructure to make actions as efficient and cheap as possible; 6) Shared governance of the initiative; and, 7) Some activities should be organized by a central body. On that basis, she supported Bob's options 1 (ad hoc cooperation) and 3 (LxE Network).

Manuel Ruiz commented about the conference and responded to some of Cees de Haan's comments. Manuel concurred with the assessment that the main actors were out of the discussion. He argued that we need to enhance face-to-face discussions with them (farmers) and other actors (environmentalists, policy-makers) to make sure their views are taken into consideration. He feels that building bridges will require more than just a simple exchange of propositions, documents, letters or bulletins. He believes in the value of personal contacts and face-to-face traditional discussions, so he recommends putting this mechanism into our strategies for the future, together with the use of modern approaches such as the Virtual Center, a proposal he supports. He called our attention to the fact that when we talk about rural people all members are included and that making specific points about the role of women will lead to claims to dedicate equal time to men or children. He remarked an earlier comment he made about the need for funding agencies to make sure that projects are somehow tied to environmental concerns. With respect to education, he argued that what matter is not where the training is effected but how it is effected and to what global objectives the training is tied. He noticed that many of us (from developing countries) have been formally trained in the developed world and that has not impeded us from using the knowledge and techniques so obtained to try to solve our countries' problems.

P. Leegwater disputed Cees de Haan assumption that including environmental costs in livestock production may aggravate the inadequate nutrition of poor farmers. He reasoned that poor households give priority to food items other than animal products,

which are used to buy other food commodities such as grains and beans. Thus, he thinks that in the context of food security and poverty alleviation livestock production is important, not consumption. He argued that the increasing demand for animal products is from people with purchasing power, a fact that gives the livestock sector more opportunities to include environmental costs in production. He agrees with the suggestion that some environmental degradation have to be accepted to generate sufficient means for development of poor farmers but he sees no reason for intensive livestock production benefiting from the same license. On industrial systems, he does not expect that they will contribute anything positive to reduce the pressures on marginal areas used by smallholder farmers who primary keep livestock as a security asset, as pressures are not only related to livestock but to other factors such as crop encroachment and fuel wood harvesting. He considers that under those circumstances it may even be beneficial to increase the role of livestock through the introduction of multipurpose shrubs and trees for feed, fuel and erosion prevention.

Curtis Hoffman recommended the intervention of NGO's and producers to design and conduct pilot projects, which reduce environmental effects of livestock, production and increasingly meet human needs. International organizations should support those projects and disseminate results. He responded to Miguel Velez suggestion that prices of animal products should rise to compensate producers for their expenses in environmental corrective actions by arguing that more income for livestock producers would result in more destruction of forests to increase productive areas and get more income which will be oriented to buy goods such as vehicles, refrigerators, etc. rather than to environmental corrective actions. He said that his approach is to trade (to offer goods and services) rather than to pay for participation in conservation oriented projects. Concerning Bob's options he is interested in the virtual center.

J.C. Wandemberg pointed out that development initiatives have not been successful. He argued that research should focus on the development of policy recommendations and models for resource use based on the understanding of systemic issues leading to resource misallocation, over-exploitation and unsustainable project outcomes. He

claims that human behaviors and factors that influence and motivate those behaviors are central to the understanding to socio-economic and environmental sustainability. He stressed the role of organizational structure of development initiatives (whether they are bureaucratic or participative) on socio-economic and environmental outcomes.

Aslam Pervez Umrani expressed a pessimistic view of Bob's proposal. However, he thinks that we should start from a minimum approach and then move towards more complex ideas. Going back to the arid and semi arid lands discussion, he thinks that the opportunistic way of utilization supported by Cees de Haan will lead to biodiversity losses.

Miguel Velez stressed that the merit of the virtual center proposal is that it would bring together a large number of people from different disciplines. So he questioned the idea of splitting it along disciplinary lines and prefers to do it by geographic areas.

On the same issue, Raul Vera commented that he favors the LxE-Network as a preliminary step leading to, if successful, a virtual center. Furthermore, the Network would be acceptable to most institutions whereas the creation of a new, albeit virtual, Center would introduce un-needed "noise" when most international institutions are in the midst of a process of change.

Sitanon Jesdapipat supported, in principle, Bob's proposal but cautions that not all stakeholders will have equal chance to participate. He suggested having regional virtual sub-centers as well. About the forgotten actors, he pointed out that in Thailand men have a more active role in livestock herding, whereas women have an important role in dairy. Concerning industrial livestock production in Thailand, it is concentrated in the hands of a few large firms and small pig farms are almost gone out of business. This trend is worrisome as domestic livestock rearing provides both cash and food for the family. Regarding Orskov's comments on methane production, he thinks that although methane production from livestock in Asia is small compared to other sources, the issue is important enough to deserve attention.

Robin Reid sent her comments on research approach, research areas and

strategies/partnerships. On research approach, Robin pointed out four weaknesses that call for change. One is the lack of a systems approach. The second weak aspect is the lack of a true inter-disciplinarity/cross sectorial approach, which is currently mimicked by just a collection of disciplines working in the same place. Her third criticism to research approach is that there is not enough broad-scale focus as most often our work is a collection of case studies with little attempt to tackle large-scale questions. His fourth comment argues for the adoption of a dual approach concerning our relationship to policy makers and how and when to inform them: on the one hand, we should present current knowledge in ways policy makers can understand, making clear that our knowledge is evolving; on the other hand, we need to develop a knowledge base that can be continually updated as we learn more. On research areas, she mentioned a few important issues such as the value of various ecological resources and services in production systems, the positive impacts of livestock on the environment, the suggested link between increased wealth and increased ability to conserve the environment, and the disequilibrium theory as an hypothesis to be tested. On strategies and partnerships, she calls for a more active collaboration between livestock scientists, agronomists and ecologists and for the adoption of proactive strategies to solve environmental problems instead of just describing degradation "after the fact."

Miguel Velez responded Hoffman's comments by arguing that law can control access of farmers to more forestland. He thinks that pretending to protect the environment by keeping farmers poor will not work. He argues that by giving the farmer ownership over the land, society has given him the right to do with it as he sees fit and to survive he just mines it. In Miguel's views, if we value the resources being destroyed we will have to pay farmers for not doing it.

Sam Bingham responded to Cees de Haan's comments. On the virtual center and its value for influencing policy makers, Sam gives the virtual center the status of a conference and assigns a crucial role to the moderator. On building bridges, he also thinks the moderator plays a vital role. On actions to be taken now, he criticized this conference (and also another conference on desertification) for producing virtually

nothing about how to manage livestock better. On international standards and internalizing environmental costs, he leaves the issue to the economists except to point out that the goal of sustainability implies that any solution that carries a net cost is unsustainable. About the industrial systems, endorsed by the authors of the discussion papers, Sam questioned the sustainability of such systems in the US and the EU, arguing that they are heavily subsidized. He claims that we have neglected research on rangelands and have no idea what restoration and reinforcement of degraded rangelands and integrated farms could do to production.

Juan Marini-Neyra commented that one of the reasons for overgrazing is that farmers increase stocking rates during good years and try to keep the same rates during bad years. He believes that the improvement of medium and long-range weather forecast would help us to manage livestock and noticed that nobody in the conference has mentioned weather forecast as a tool to make systems more sustainable.

Francis Epulani suggested that Robin Reid's recommendations on proactive research/strategies might need stretching to include participant observation by environmental scientists. Francis think that scientists need to pick out the whys of farmers' decisions and activities, and seek from them answers to the LxE interaction questions.

A message from Rio de la Vista responded to Peter Scogings' reaction against Monte Bell's recommendation of the Holistic Management Model. The Rio de la Vista correspondent was concerned that Peter Scogings had misunderstood or was not current with the evolved state of holistic management from its early development in southern Africa in the 1970's. The correspondent was also concerned by Peter's demand that to be valid, a model must be always in all situations effective. He provided a number of advantages of the model, one of them being that it seriously strives to be "holistic and systems oriented" as others contributors to this conference have advocated is profoundly needed. He also suggested that the Holistic Management model have a high potential to help policy makers evaluate and formulate more holistic policies. Rio de la Vista contributor supported the virtual center concept and hoped that

the lack of access to it by some will spur us to help obtain more access for more people.

Jamie Graham pointed out the need to educate and financially incentive people to avoid problems of unplanned or unexpected pollution. It is suggested that the best education come from the peer level so there is the need to find the success farming stories and help those operators promote their methodology.

M. Kiley-Worthington commented on the rift between farmers and scientists, as their sources of knowledge and their practical experience are different. The contributor argued that only those with a serious understanding of both the practical and the theoretical knowledge and limits are in a position to help. M. Kiley-Worthington suggested to encourage interdisciplinary groups, including farmers and scientists, to help farmers help themselves by encouraging him to question some traditional practices and use his own abilities to solve problems.

Curtis Hofmann stood firm in his previous comments disputed by Miguel Velez. He believes that for his local situation (Amazon Uplands in Ecuador) extensive cattle raising is not an appropriate activity so his project tries to catalyze the change to other productive endeavors.

Burton Smith intervened in the discussion about the Holistic Management Model and the favorable comments about the grazing theories of Allan Savory (made by Sam Bingham). Although Burton questioned Mr. Savory's tendency to "take credit for everything," he argued that the truth of the matter is that those farmers who are following the tenets of intensive grazing (put together by Savory in such a way that it made sense to ranchers) included in the Holistic Management Model, are far better stewards of the land than those who don't. He recommends that an educational program be set up consisting of farmers and ranchers that have demonstrated competence in intensive or knowledge based (as opposed to technology based) grazing. He also expressed his support for the virtual center as a way for stakeholders to come together to act as a conscience to government.

Gerhard Nortje argued that we have to distinguish between the social upliftment of rural communities, and the introduction of emerging farmers into main stream agriculture, both issues equally important but requiring different approaches. He called our attention to the fact that 15-30% of the food produced in Africa is lost postharvest. He asked whether it is necessary to concentrate on the advancement of animal and food production in the region, or would the focus be on post harvest technology.

Pierre Hiernaux commented several issues. About Bob's networking options, Pierre supports the minimum approach or ad hoc cooperation option. His reasons are the higher costs and the time involved in the other options, and the lack of equipment in developing countries. He agreed with Cees de Haan that testing the validity of opportunistic range management (ORM) is an academic objective. However, he thinks that the characterization of ORM is needed to guide action. On the action side, he gives priority to re-enforcing the rural communities' management and control of natural resources. He also recommends verifying the "non-equilibrium" model of vegetation dynamics and assessing its implications for pastoral resource management. Pierre declared that he is uncomfortable in considering policy makers as an entity. For him, policy decisions results of a web of influences to which all stakeholders, including political authorities, contribute although very unequally. He doesn't think it is justified to oppose research to action. He thinks research should help actions by providing diagnosis, monitoring and impact assessments.

Sitanon Jesdapipat argued that impacts of climate change on livestock are an important issue that we have not addressed.

David Rutley supported the idea that we need to educate the whole community in the areas where livestock production is causing land degradation and affecting agricultural sustainability. He also quoted and supported suggestions that before solving environmental problems, we should try to improve the living standards of the people in the areas of concern.

Ralph Rise, who is a science teacher in a rural high school, expressed his enthusiasm about a successful Washington State University program based in the application of the

### Holistic Management Model.

Christiane Willeke-Wetstein provided a short description of the Environmental Risk Analysis as a tool for environmental impact assessment and made several recommendations concerning livestock-environment interactions. She suggested to set up locally applicable Environmental Quality Objectives, identify and quantify impact from livestock, analyze the socio-economic framework of animal husbandry and define socio-economic objectives, and, bring all stakeholders together for discussions and decisions made in a fully representative and participative procedure.

Jan Slingenbergh and Henning Steinfeld discussed the evolution of agriculture up to the present situation of eco-manipulation which are creating a very complex situation which we are not sure how much longer we can keep going. They pointed out to two opposite trends, which are becoming universal phenomenon. On the one hand, there is a move towards individualization by which decisions are taken at the lowest possible social level to create ownership and direct responsibilities. On the other hand, there is the process towards globalization, not only of trade and commerce but also of problems such resource degradation. Jan and Henning pointed out that the fabric of globalization, the rules of the game at the supra national level and the acceptance of where the benefits go and who pays have not yet been defined. They believe that the LxE initiative may contribute in this sense.

The Wageningen Group sent their comments on some recommendations. They think there is no need for a new virtual center but efforts should be made to link with existing networks. They argued that the livestock sector is reluctant to change from its focus on how to produce more, even though livestock specialists trained to increase productivity are trying to look at livestock production in a broader context but tending to exclude outsiders (who are critical of production methods) from the discussions. The WG suggest that the livestock specialists should stimulate co-operation with all stakeholders. As a increasing demand for livestock products is a premise of the study and the conference, the WG criticized the lack of discussion about the possibilities of influencing the demand in order to reduce the pressure on the livestock sector and

create more time to concentrate on production systems with less negative environmental effects. They argued that it is not well explained (in the study) why the grazing and mixed production systems could not satisfy the increasing demand and questioned the priority given to industrial systems without an explicit comparative consideration of environmental and social costs. As nowadays development programs require an environmental impact assessment they recommended that livestock specialist and environmentalists work together to improve assessments. The WG agreed with Cees de Haan comment that further development of the industrial system should be left to the private sector. The WG thinks that development funds should be used to facilitate the rural and smallholder sector to compete with the industrial sector. On research and education they agree with Robin Reid's recommendations and asked about the inclusion of new approaches in international training programs.

Shadi Hamadeh agreed that research has to be interdisciplinary, interactive, participatory and dynamic. However, he thinks that interactive analytical methodologies are still behind available tools. He also thinks that innovative approaches require novel institutions but he is concerned that a virtual center will yield virtual realities.

Keith Ramsay listed several issues that need further consideration. First, he criticized the introduction of exotic breeds to Africa arguing that they do more harm to rangelands than local breeds. However, he also commented that animals get a lot of unsubstantiated blame for environmental degradation when the real culprits are migratory croppers. He considers that too little attention was given to improving basic animal husbandry and rangeland management skills. He argued that provision of free services such as free access to communal land and vaccines promoted larger herds and disadvantaged local breeds, which fare better than exotics in the absence of artificially suppressed financial constraints. About range management in a communal situation Keith believes that stakeholders' participation in the planning and development of grazing camps and facilities promoted a more balanced utilization of natural resources. He suggested an information system that enables livestock farmers to make an informed choice of breeds, animal husbandry and range management. He also

called for market related services. He proposed to carry out a comprehensive resource inventory and a review of current management practices.

Peter Scogings responded to Rio de la Vista comments about the HRM and reasserted some of his previous criticisms.

Almero de Lange commented that with increasing costs of medicines and feed ingredients and market deregulation's, in Southern Africa commercial farmers are changing from exotics to indigenous cattle breeds. He also mentioned that law has laid down stocking rates in South Africa since 1942 and that linking with drought relief and an inspection service enhanced compliance.

Lawrence Tawah thinks that the idea of a virtual center is a good one but would require considerable investment so he suggested that organizers should prioritize the problems that need to be tackled before submitting for funding. Lawrence suggested trying to solve the lack of electronic means in developing countries. He argued that we should consider more than one of the proposed options for networking, combining ad hoc cooperative groups with networks and the virtual center as the clearinghouse. He supported Keith Ramsay's comments on the issue of the contribution of indigenous breeds to conservation of the environment.

## **VI. THE LOCAL CONSULTATIONS**

The second component of the Global Consultation was the round of national or regional non-electronic consultations. At the planning stage of the Global Consultation, it was intended that results from local consultations were to be opportunely inputted into the E-conference. The objective of the local consultations was to give stakeholders from selected developing countries, who might have no access to E-mail, the opportunity to have their views on livestock, environment and human needs interactions inputted to the E-mail global conference. Although a number of reports (17 from 20 countries) from the local consultations were shared electronically with conferees during the final stages

of the E-conference, there was no time for them to make a contribution to the general discussion.

Local consultations were organized and carried out in the following countries:

a) Individual country consultations:

Bolivia	Jordan	Nigeria
Colombia	Lebanon	Panama
Egypt	Mexico	Peru
India	Nicaragua	South Africa
Jamaica	Niger	Yemen

b) Regional consultations:

- South America southern cone consultation:

Argentina	Chile	Uruguay
Brazil	Paraguay	

- Southern Africa consultation:

Botswana	Namibia	Tanzania
Lesotho	South Africa	Zambia
Malawi	Swaziland	Zimbabwe

With the exception of the South American southern cone and the opportunistic consultation in Southern Africa, local consultations were carried out in selected individual countries. In all cases, interviews and/or roundtables involving representatives of different categories of stakeholders were conducted by selected local convenors. The conference organizers previously defined questions and discussion

issues. In most cases, consulted stakeholders included livestock farmers, crop-livestock producers, farmers groups, government officials and policy makers, educational institutions, NGO representatives, agricultural and social scientists, extension agents and industrialists.

Although there was some variations due to particular limitations, local consultations included both personal structured interviews and roundtable consultations. Full guidelines, including the questions and issues to be asked and discussed were sent to local convenors. Both the work plan and the guidelines for the local consultation were sent in due time to all concerned, in English, French and Spanish languages, as appropriate.

It was intended that the intermediate (interviews) and final (roundtables) results from the local consultations be opportunely inputted into the main E-conference, in order to have a feedback at a local level. Unfortunately, time restrictions did not allow the process to go as planned.

## **VII. CONCLUSIONS AND RECOMMENDATIONS FROM THE GLOBAL CONSULTATION PROCESS**

The conclusions and recommendations from the global consultation can be summarized at both the level of the local consultation and the level of the electronic conference. The local consultation provided some more specific answers to structured questions about the state of natural resources, the driving forces of degradation, the role of livestock in natural resources degradation, the current response of society, and the recommendations to mitigate the negative impacts of livestock on the environment. On the other hand, discussion in the E-conference were more open and covered issues of a more broad significance.

### **1. State of the natural resources as reported by local consultations**

There is a striking coincidence in most reports in describing a critical state and an ongoing process of degradation of all natural resources and environmental variables. All reports coincide in pointing out deforestation, soil erosion, reduced soil fertility, biodiversity losses, water contamination, waste disposal, and greenhouse gasses emissions as ongoing environmental problems. However, the direct links of livestock production as immediate causal factor of significant environmental degradation appear less clearly. There is a paucity of data about the role of livestock production in such degradation. This paucity of information is shown by the fact that quantitative indicators of natural resources conditions and trends, as affected by different livestock production systems and management are seldom quoted. It is also noticeable that for participants was easier to mention environmental degradation than to describe positive effects of livestock on the environment. For instance, mentions to the carbon sequestration potential of grasses, the preservation and restoration of soil microfauna, and the capture and protection of water resources by rangelands were almost absent.

## **2. Driving forces of natural resources degradation**

Most reports coincide in listing the following driving forces of environmental degradation: increasing human population pressure, micro and macro economic policies, cultural values, poverty, land tenure characterized by communal ownership, lack of appropriate technology to harmonize productivity with resource conservation, lack of awareness of the livestock-environment-human needs interactions, lack of infrastructure to facilitate marketing, and lack of involvement of local communities in their own development. Some of the reports pointed out that livestock is not a primary driving force.

## **3. The role of livestock on resource degradation**

Participants in the local consultations do not explicitly describe direct negative impacts of livestock on natural resources. Thus, there is no indication of how much of the observed environmental degradation is directly attributable to livestock production. However, the following causal relationships concerning direct livestock effects on natural resources, are quoted: Overgrazing, overstocking, and feeding of crop residues to livestock without returning manure to the land.

#### **4. The response of society to environmental degradation**

In general, reports indicate that there is a poor response of society, due to the low awareness of environmental issues. However, some trends such as the creation of Government's environmental bodies, environmental NGOs, and the inclusion of environmental concerns in policy formulation are emerging. But the problem remains of insufficient scientific data to inform policy makers compounded by the lack of effective interaction between scientists and policy makers. There is also a lack of effective social participation in policy making and mechanisms to enforce environmental legislation.

#### **5. Recommendations to mitigate the negative impacts of livestock on the environment**

The following recommendations were produced in the interviews and roundtables carried out in the local consultations:

##### **a) Policies:**

- Stop subsidies for feedstuff
- Stop communal grazing systems
- Establishment of land ownership for range lands

- Internalizing of environmental costs
- Inclusion of environmental issues in policy formulation
- Participatory and informed policy making
- Incentives to promote adoption of new technology

b) Development projects:

- Environmental Impact Assessment should become an integral part of development projects.
- Mandatory involvement of grassroots communities and organizations.

c) Research

- More investment
- Development of technologies that enhance productivity with no adverse effects on the environment
- Participative development of agrosilvopastoral systems

d) Production systems:

- Crop/livestock systems which employ soil conservation techniques should be encouraged
- Agrosilvopastoral systems which contribute to increased productivity with minimum negative impact on the environment should be encouraged
- Increase the use of adapted and improved grasses and legumes

e) Social empowerment

- Economic terms of exchange between rural and urban products should be equitable

f) Education:

- Increase public awareness of environmental issues
- Raise education levels in rural areas

g) Institutional framework

- Create effective mechanisms to enforce environmental legislation

## 6. Conclusions from the electronic conference

Conclusions from the electronic conference are not disparate from the conclusions arising from the local consultations. On the contrary, both sets of conclusions are complementary, which is significant as they originate from different kinds of stakeholders with a tendency to cover issues at different level of analysis and application.

Main conclusions from the electronic conference were:

- Livestock get a lot of unsubstantiated blame for environmental degradation.
- Although there are environmental problems associated with livestock, concomitant examples of successful strategies to enhance positive and limit the adverse effects of livestock on the environment are also found.

- There is a paucity of information on livestock agriculture and the environment.
- There is a lack of systems approach in research.
- There is a lack of true interdisciplinarity in research.
- There is not enough broad-scale focus in research.
- Research on livestock-environment interactions is not proactive.
- Current educational models results in a way of thinking and acting closely related to the dominant productivist model of agricultural and rural development, which is currently challenged by eco-development and livelihood-sustainability considerations.
- There is a rift between scientists and policy-makers thus policies are often designed by economists and environmentalists without a holistic analysis of the problems and without any technical argumentation.
- On human needs, we need to clarify whose needs and what needs are we referring to.
- Several participants questioned the positive views about industrial systems and the environment put forward by the authors of the discussion document.
- Several participants questioned the negative views about the potential of grazing systems to satisfy the growing food demand, put forward by the authors of the discussion document.

- There is a rift between farmers and scientists as their sources of knowledge and their practical experience are different.
- Two opposite trends are becoming universal phenomenon. On the one hand, there is a move towards individualization, to create ownership and direct responsibilities. On the other hand, there is the process towards globalization, not only of trade and commerce but also of problems such resource degradation. However, the fabric of globalization, the rules of the game at the supra national level and the acceptance of where the benefits go and who pays have not yet been defined.
- The livestock sector is reluctant to change from its focus on how to produce more, even though livestock specialists trained to increase productivity are trying to look at livestock production in a broader context but tending to exclude outsiders (who are critical of production methods) from the discussions.
- Several participants criticized the introduction of exotic breeds to African production systems.

## **7. Recommendations from the electronic conference**

- Environmental standards to avoid pollution should be internationally agreed.
- Refocusing research through the use of a true interdisciplinary systems approach.
- Farmers' organizations and R&D institutions should interact regularly with policy-making bodies.
- Participation of grassroots organizations in policy-making.
- Empowerment should be given to grassroots organizations.

- Policies should not only protect the environment but encourage more lucrative ways of managing livestock as any attempt to minimize livestock impact on the environment are bound to be futile if farmers do not have better economic alternatives.
- To bridge the gap between the technical people, producers and policy makers in order to provide a holistic analysis of the problems and allow the argumentation by all interest groups.
- Definition and measurement of indicators of sustainable livestock production.
- Livestock projects should be tied with the condition that they deal with concomitant environmental effects and policy analysis and design.
- Active education of all stakeholders and social actors using novel approaches such as peer teaching and university-farmer programs.
- To develop academic training programs that incorporate issues such as sustainability, natural resource protection, gender in the rural context, and knowledge generated by local research.
- The funding of regional centers for rural and agricultural development.
- The establishment of a Virtual LxE Center.
- Enhancement of mechanisms of face-to-face discussions between farmers, researchers, policy-makers, environmentalists and all other stakeholders, in a complementary way to the Virtual Center.

- Further development of the industrial system should be left to the private sector.
- To set up locally applicable Environmental Quality Objectives.

## VIII. LESSONS LEARNED

Several lessons have been learned with this project. One of the most obvious lessons is that time is essential for planning and conducting a process involving an e-conference and local consultations. Our original plan was to establish a close integration between the electronic exchange and the local non-electronic consultations, creating a two-way flux of information and a unified debate of both global and local issues. It was not easy (actually, it never occurred) to achieve this integration. Although time was the limiting factor (when the e-conference was ending, we still were organizing local consultations), it is necessary to figure out how to appropriately link both levels of consultation. One important way is to define a common agenda (although at different scenario levels) for discussion. In our case, the leitmotiv of the electronic exchange was the multi-donor study whereas the local consultation followed a structured set of questions (which were actually based in the study approach). Again, there was no time for electronic conferees to debate the local assessments in a critically comparative way with the global assessment provided by the multi-donor study. Of course, this does not invalidate to any extent the exercise because we have the information and both set of conclusions and recommendations can be further analyzed. Time again militated against the intention to make a full presentation of the results of the global consultation at the Wageningen meeting.

Perhaps another lesson is the importance of having a well-defined set of issues to be discussed and a more frequent intervention of the moderator to promote a full discussion of the relevant issues. It was a common occurrence during the exchange that an issue was brought up to the attention of conferees but after a rapid

acknowledgment of its importance it was dismissed and the attention moved into another issue. Several important issues were not discussed during the exchange, such as the importance of women in livestock systems; the role of pastures and grasslands in carbon sequestration, soil protection, water cycling, and soil microfauna population; the interaction between eco-regions (i.e. downstream effects of the Andean socio-economic, political and NR management on the Amazon region); and the consequences of land clearing methods (i.e. frequent use of heavy machinery) on soil degradation in many ranching systems frequently taken as examples of pasture unsustainability in tropical soils. On the social side, the issue of education and empowerment of rural communities was, perhaps, not given the attention it deserves.

## **IX. SUGGESTED FOLLOW-UP ACTIONS**

Follow-up actions should be based on a clear identification of important issues brought about by the global consultation. Three main issues appear to have an overwhelming importance as determinants of the nature of the interaction between livestock, the management of natural resources, the environment and the satisfaction of human needs. Those three issues, which are interrelated, are policies, education and research. As to policies, it is clear that scientists of all fields of research should establish strong links with policymakers in order to provide them the information about both the effect of different policies on production systems and the particular policy and macro-economic environment required by particular technologies. It is also required that bio-scientists interact with social scientists in order to design technologies that fit into a given socio-economic context. So many times, lack of adoption of technology can be traced to this disynchrony between technologies and socio-economic context. These issues have been discussed or suggested to some extent during the consultation. As a consequence, proposed follow-up actions discussed among some of the consultation management team members (FAO, ILRI) include the design of a tool kit to facilitate the policymaking process with regard to livestock, the environment and human wellbeing.

It is evident that the issue of technology-policy interactions have a bearing on research approach, calling for a truly multidisciplinary, holistic research. Compelling arguments that holistic, integrated research is still more rhetoric than real have been put forward during the electronic exchange. As a follow-up, imaginative ways of multidisciplinary, eco-regional research, such as those being currently organized by ILRI, have to be appropriately funded.

Education as a tool for people's empowerment and concomitant social and economic advancement is another main issue. Follow-up actions should include a comprehensive participative research effort in which rural people are not only the providers of information and decision-makers at the farm level but the recipient of fundamental, transcultural health and nutrition knowledge. Health and nutrition variables should be incorporated as important components of project design and appropriate health and nutrition indicators should be used to evaluate project outcomes.

## **X. ACKNOWLEDGEMENTS**

A number of people and institutions collaborated in both the electronic conference and local consultations. We duly acknowledge the following collaborators:

IDRC

FAO

INFORUM

IICA (RISPAL)

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Global Consultation Management Team (Don Peden, Hugo Li-Pun, Cees de Haan, Henning Steinfeld, Robert Hart, Mamadou Diedhiou, Emmanuel Mwendera and Victor Mares).

Local consultation organizers and reporters: Francis Asiedu (CARDI, Jamaica), Sahr Lebbie (ILRI, regional consultation in Southern Africa), Sonia Chifflet and Carlos Arellano Sota (South America Southern Cone regional consultation), Jimmy Smith (ILRI, Nigeria), Ercole Zerbini (ILRI, India), B.K. Mathur (CAZRI, India), Manuel Ruiz (IICA/RISPAL, Nicaragua), Shadi Hamadeh (American University of Beirut, Lebanon), Manuel De Gracia (IDIAP, Panama), Ruben Dario Jaramillo (Colombia), Mahfouz Abu-Zanat (The University of Jordan, Jordan), O. Al-Saghier (AREA, Yemen), L. Reynolds (ICARDA, Yemen), Theunis C. Meyer (North West Agricultural Development Institute, South Africa), Everardo Gonzalez Padilla (Mexico), Lutgard Kagaruki (Tanzania), Abdou Salla (Niger), Essam Shehata (Egypt), Oktay Gursay (University of Cukurova, Turkey), Euan Thomson (ICARDA, WANA Countries), Carlos Leon-Velarde (CIP/CONDESAN, Peru), Alfredo Riesco (CODESU, Peru).

Contributors of specific tasks were: Helen Raij (IDRC/LARO, Uruguay), Nadine Saad (IDRC, Canada).

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## **ADDENDUMM**

Since the date this report was written, several publications derived from the electronic conference have been produced.

Also, various follow up actions to the project have been initiated.

Herewith, we provide a list of those publications and a brief description of the follow up activities.

### **1. Publications**

LI PUN, H., C. SERE AND D. PEDEN. 1997. Balancing Livestock, Environment and Human Needs: An International Perspective. Proceedings of the 47<sup>th</sup> Annual Meeting of the Canadian Society of Animal Science, Montreal, Quebec, July 24-26, 1997.

HUGO LI PUN, E.J. MWENDERA, V. MARES, B. HART, H. STEINFELD, D. PEDEN, C. SERE, C. DE HAAN. 1998. Global consultation on balancing livestock, environment and human needs. Proceedings of the International Conference on Livestock and the Environment, 16-20 June 1997, Ede/Wageningen, the Netherlands.

EHUI, S., LI PUN, H., MARES, V. AND SHAPIRO, B. 1998. The role of livestock in food security and environmental protection. Outlook on Agriculture Vol. 27, No. 2, 1998, pp 81-87.

LI-PUN, H. AND LEON-VELARDE, C. U. 1998. Research and Development on Mixed Systems in the Andean Eco-Region: An Overview and Institutional Approach. Report of FAO Expert Consultation on Policies for Animal Production and Natural Resources Management. Brasilia, Brazil, 18-20 May 1998.

LI PUN, H. AND MAASS, B. L. 1998. The role of international livestock research in addressing human needs and the environment. Invited article "Entwicklung + landlicher raum". Vol. 32(4), 1998. pp 20-23.

ILRI (International Livestock Research Institute). 1998. ILRI 1997: Livestock, people and the environment. ILRI, Nairobi, Kenya.

### **2. Follow-up activities**

A research proposal entitled Enhanced Human Well-being through Improved Livestock and Natural Resource Management in the East African Highlands was

successfully submitted to IDRC. The project, intended to integrate human health, agricultural and environmental issues, is currently conducted in Ethiopia.

Proposals are being developed to expand the same subject for other locations in East Africa, and to link research on watershed management in the East African Highlands, the Andean region and the Hindu Kush Himalayas. They will be submitted to CIDA, IFAD and SDC.

The CGIAR Systemwide Programme on Participatory Research and Gender Analysis and the CGIAR Gender Programme convened by CIAT have both awarded small grants to review the impact of participatory approaches on technology adoption, and the role of gender in livestock production and human health and nutrition.

All these proposals and planned research activities are based on the conclusions and recommendations of the electronic conference.