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Global Livestock  
Collaborative Research Support Program



Animal Source Foods and Nutrition  
in Developing Countries



Conference Program

June 24 - 26, 2002  
University of California Washington Center  
Washington D.C.

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*The Global Livestock CRSP is comprised of multidisciplinary, collaborative projects focused on human nutrition, economic growth, environment and policy related to animal agriculture and linked by a global theme of risk management in a changing environment. The program is active in East Africa, Central Asia and Latin America. The projects involve researchers from over 100 organizations and institutions in the US and abroad. Funding for the GL-CRSP is provided in part by the Office of Agriculture and Food Security, Global Bureau, United States Agency for International Development, U.S. Universities and host country institutions. The opinions expressed herein are those of the authors and do not necessarily reflect the views of USAID.*

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Collaborative Research Support Program



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Collaborative Research Support Program,  
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Heifer Project International, and Land O'Lakes.



*Pond Dynamics/  
Aquaculture CRSP*





## WELCOME

*Welcome on behalf of the Global Livestock Collaborative Research Support Program. For those of you unfamiliar with the GL-CRSP, I invite you to stop by our poster and learn more about our program. CRSPs represent one of the very best of USAID's efforts to link research, education and development solutions.*

*This conference brings together researchers, educators and development agents from a variety of disciplines. In the past there has existed a considerable disconnect between human nutrition and agricultural production systems. One of the primary reasons for this lack of integration was the emphasis in international development on the quantity of food as the sole criterion for satisfactory nutritional status. The emphasis has been on survival.*

*However, the future of development rests in the capacity of children. Beyond survival, a child needs a nutritional environment that is sufficiently diverse to allow full cognitive and physical development. By ignoring the quality of those who survive, we trade creativity for cost; those who would contribute to society become those who cost society.*

*I hope that the bright and creative minds that are participating in this conference can be stimulated and motivated by the presentations and discussions. We hope to come away with a set of constraints and priorities for research that will set the agenda for not only our CRSP but also the nutrition and development communities.*

*Dr. Montague W. Demment  
Program Director  
Global Livestock CRSP*



## WELCOME

*I am pleased to welcome conference participants to the University of California Washington Center.*

*The University of California has had a long and important presence in our nation's capital. UC has a strong partnership with the federal government including management of the three laboratories and is the recipient of significant federal research and program dollars. The academic programs first began in September 1990 when students from UCLA and UC Davis arrived for the Fall Quarter. Today, all eight undergraduate campuses have students and faculty in our experiential-learning program. Students participate in internships, enroll in elective courses taught by UC faculty in the Center, and can sign up for numerous activities and excursions that are coordinated by the residential life and student services staff.*

*The new building opened in Fall 2001 and was officially dedicated on April 23, 2002. We are home for up to 280 students and faculty, the university's federal governmental relations office, as well as university research units. All of the teaching and conference venues have access to an extensive array of technologies that include multimedia, network, and high speed internet capabilities. Network connections exist at each bedside in the residence and there is a distance learning lab as well as a 24/7 computer lab with high speed DS-3 connections.*

*I hope that your conference is a productive one and that you enjoy our Center facility. Those seeking additional information about the Center are encouraged to visit our web page at [www.ucdc.edu](http://www.ucdc.edu)*

*Professor Larry Berman  
Director  
UC Washington Center*



# AGENDA

MONDAY, JUNE 24, 2002

8:00 - 8:25     *Registration*

8:30 - 9:30     *Introduction*

8:30             Welcome

*Dr. Larry Berman*

*Director, U C Washington Center*

8:40             Animal Source Foods in the Development Context

*Dr. Montague Demment*

*Director, Global Livestock-CRSP*

*University of California, Davis*

Interventions for Micronutrient Deficiency Control  
in Development Countries: Evolution and Current  
Situation

*Dr. Lindsay Allen*

*Program in International Nutrition*

*University of California, Davis*

9:30 - 12:45     *Animal Source Food Consumption,*

*Past, Present and Future*

*Chair/Discussant: Dr. Daniel Sellen, Emory University*

9:30             Animal Source Foods in Human Evolution

*Dr. Katharine Milton*

*University of California, Berkeley.*

10:00 - 10:30   *Break*

Monday, June 24, 2002 continued

10:30      Animal Source Foods and Human Health During Evolution

*Dr. Clark Larsen*

*Ohio State University*

11:00      Global Production and Consumption of Animal Source Foods

*Dr. Andrew Speedy*

*Food & Agriculture Organization, Rome*

11:30      Dynamics of the Nutrition Transition and Their Implications for the Animal Foods Sector: A Worried Perspective

*Dr. Barry Popkin*

*University of North Carolina, Chapel Hill*

12:00      Discussion and Conclusions: Role of ASF in Human Evolution and Current Trends in Intake

12:45-2:00      *Lunch*

2:00-5:00      *Dietary, Nutritional and Functional Importance of Animal Source Foods*

*Chair: Dr. Nimrod Bwibo, University of Nairobi, Kenya*

*Discussant: Dr. Barbara Underwood, National Academy of Sciences, Washington DC.*

2:00      Operationalizing Dietary Diversity: Conceptual and Measurement Issues

*Dr. Marie Ruel*

*International Food Policy Research Institute  
Washington DC.*



**Monday, June 24, 2002 continued**

- 2:30            **The Nutritional Importance of Animal Source Foods**  
*Dr. Suzanne Murphy*  
*University of Hawaii*
- Dr. Lindsay Allen*  
*University of California, Davis*
- 3:00            **Micronutrient Deficiencies and Human Growth**  
*Dr. Juan Rivera*  
*Instituto Nacional de Salud Pública, México*
- 3:30 - 3:50    *Break*
- 3:50            **Micronutrient Deficiencies and Cognitive Function**  
*Dr. Maureen Black*  
*University of Maryland*
- 4:20            **Discussion and Conclusions: The Importance of**  
**Animal Source Foods for Food Security, Dietary**  
**Diversity, Nutritional Status and Human Capital.**
- 5:00 - 6:30    **Wine & Cheese Reception**  
*Sponsored by Land O'Lakes*
- Poster Session**  
*Abstracts for many of the posters can be found in this*  
*program.*

**8:30 – 12:30**   *Efficacy Trial: Effects of Animal Source Food Supplements on Nutrition and Development of Schoolers in the Kenya GL-CRSP*  
*Chair: Dr. Montague Demment, GL-CRSP*  
*Discussant: Dr. Abuid Omwega, University of Nairobi*

**8:30**   Background: The Need for Animal Source Foods in Kenyan Children  
*Dr. Nimrod Bwibo*  
*University of Nairobi, Kenya*

**8:50**   Project Overview: Hypotheses, Design, Sampling, Variables Measured  
*Dr. Charlotte Neumann*  
*University of California, Los Angeles*

**9:10**   The Feeding Interventions  
*Ms. Constance Gewa*  
*University of California, Los Angeles*

**9:25**   Statistical Analyses  
*Dr. Donald Guthrie*  
*University of California, Los Angeles*

**9:45**   Effects on Food and Nutrient Intake  
*Ms. Constance Gewa*  
*University of California, Los Angeles*

*Dr. Suzanne Murphy*  
*University of Hawaii*

**10:15 - 10:40**   *Break*

Tuesday, June 25, 2002 continued

- 10:40            Effects on Micronutrient Status  
                    *Dr. Lindsay Allen*  
                    *University of California, Davis*
- Dr. Charlotte Neumann*  
                    *University of California, Los Angeles*
- 11:00            Effects on Cognitive Function, Behavior, and Physical  
                    Activity  
                    *Dr. Shannon Whaley*  
                    *University of California, Los Angeles*
- 11:30            Effects of Animal Source Foods on Growth, Body  
                    Composition and Morbidity  
                    *Ms. Monika Grillenberger*  
                    *Wageningen University, The Netherlands*
- Dr. Charlotte Neumann*  
                    *University of California, Los Angeles*
- 11:50            Summary, Policy Implications  
                    *Dr. Charlotte Neumann*  
                    *University of California, Los Angeles*
- 12:05            Discussion: Comments and implications
- 12:30 - 2:00    *Lunch*

Tuesday, June 25, 2002 continued

2:00 – 6:00     *Case Studies: Examples of Programs to Improve  
Animal Source Food Production and/or Consumption.  
Chair/Discussant: Dr. Marie Ruel, International Food  
Policy Research Institute, Washington DC.*

2:00            Indonesia -  
                  *Dr. H. Hardinsyah  
                  Bogor Agricultural University*

2:20            Viet Nam –  
                  *Dr. Le Thi Hop  
                  National Institute of Nutrition, Viet Nam*

2:40            Thailand –  
                  *Dr. Suttilak Smitasiri, Mahidol University*

3:00            Discussion: Lessons learned from the Case Studies

3:30 - 3:50     *Break*

3:50            Ethiopia –  
                  *Dr. Zewdeu Ayele, FARMAfrica, Ethiopia*

4:10            Perú –  
                  *Dr. Hilary Creed de Kanashiro  
                  Instituto de Investigación Nutricional, Perú*

4:30            Malawi –  
                  *Dr. Rosalind Gibson,  
                  University of Otago, New Zealand*

4:50            Fish and Poultry Programs in Bangladesh  
                  *Dr. Nanna Roos, Royal Veterinary and  
                  Agricultural University, Denmark*

5:10            Discussion: Lessons learned from the Case Studies

**8:30 - 12:00**    *Constraints on Animal Source Food Production and Consumption*

*Chair: Gilles Bergeron, Food and Nutrition Technical Assistance (FANTA), Washington, D.C.*

*Discussant: Christopher Delgado, International Food Policy Research Institute (IFPRI)*

8:30            Nutrition of Pastoralist Peoples  
*Dr. Michael Casimir*  
*Cologne University, Germany*

9:00            Solutions for Constraints to Household Production  
and Retention of Animal Food Products  
*Dr. Daniel Brown*  
*Cornell University and the International*  
*Livestock Research Institute*

9:30            Economic Constraints on Production and  
Consumption at the Macro and Micro Level  
*Dr. Henning Steinfeld*  
*FAO, Rome*

10:00          The Grameen Bank's Experience: Improving  
Nutrition of the Rural Poor  
*Mrs. Jannat-E-Quanine*  
*Grameen Bank, Bangladesh*

**10:30 - 11:00**    *Break*

11:00          Household Constraints on Consumption  
*Dr. Joel Gittelsohn*  
*Johns Hopkins University*

Wednesday, June 26, 2002 continued

11:30      Applying the NutriBusiness Concept to Increase ASF  
Consumption in Local Communities

*Dr. Audrey Maretski*

*Pennsylvania State University*

*Dr. Edward Mills*

*Pennsylvania State University*

12:00      **Conclusions:** identifying major constraints and ways  
to overcome them.

*Facilitator: Dr. Lindsay Allen*

1:00      Closing

**2:00 - 3:30**      *Priorities for research and action*  
*(Invited Session only)*

## SPEAKERS

**ALLEN, Lindsay.** Dr. Lindsay Allen is a Professor in the Program in International Nutrition at the University of California, Davis, USA. After obtaining her B.Sc. in Agriculture/Nutrition in England she received her PhD in Nutrition from the University of California, Davis, and postdoctoral training at the University of California, Berkeley.

She is an expert on the prevalence, causes and consequences of micronutrient deficiencies in developing countries and has conducted numerous interventions to assess the efficacy of micronutrient supplements and food-based approaches to improve nutritional status, pregnancy outcome and child development, resulting in approx. 150 publications.

Dr. Allen has served on the Food and Nutrition Board of the National Academy of Sciences for many years, and has been especially active in the development of the new Dietary Reference Intakes. She serves as an adviser to bilateral and international agencies including WHO, UNICEF, the Asian Development Bank, the World Bank, PAHO and FAO and has served as the President of the American Society of Nutritional Sciences and the President of the Society for International Nutrition Research.

**BROWN, Daniel.** Dr. Brown received a B.S. in Animal Science from UC Davis in 1976, Secondary School Teaching Certification in Biology and Agriculture with minors in Chemistry and Math in 1977 and a PhD in Nutrition with minors in Biochemistry and Food Science from Cornell University in 1981. His dissertation research explored the metabolic mechanisms behind diet-

induced changes in milk composition in sheep and goats.

Following graduate school, Dr. Brown went immediately to Maseno, Kenya to become the Production Systems scientist for Winrock International on a Small Ruminant CRSP project in Western Kenya. In 1983, he joined the Animal Science department faculty at UC Davis. He conducted research concerning the control of body nutrient reserves, by-product feed utilization, nutritional toxicology and a little nutritional ecology.

In 1994, he joined the Cornell University Animal Science faculty where he conducted nutritional toxicology research and led youth extension programming. In 2001, he gained a joint appointment between Cornell University and the International Livestock Research Institute and currently divides his professional time between teaching a sustainable animal agriculture course, a graduate course in nutritional toxicology and conducting research in those same two fields both in the US and in Ethiopia.

**BWIBO, Nimrod O.** Dr. Nimrod Bwibo holds a MD and MPH, and is Professor Emeritus in the Department of Pediatrics at the University of Nairobi, Kenya. He is one of the foremost Pediatricians in East Africa. He received an MPH in Maternal and Child Health at the University of California, Berkeley, and his postgraduate resident and fellowship training at UC San Francisco and University of Washington in Pediatrics.

Dr. Bwibo has been a long-term collaborator with Drs. Charlotte Neumann, Suzanne Murphy and Marian Sigman and others at UCLA going back to 1978. He was the Co-PI for the Human

Nutrition CRSP in Embu in the 1980's and is the Co PI and Kenyan Director for the current GLCRSP Child Nutrition Project. Dr. Bwibo serves on many commissions in Kenya and internationally, and has been the Deputy Director-General of AMREF in East Africa as well as the Deputy Vice Chancellor of the University of Nairobi. He has been a visiting scholar at UCLA and has numerous research publications, chapters and articles on Child Health and Nutrition.

**CASIMIR, Michael J.** Dr. Casimir has conducted prolonged fieldwork among pastoral nomads – on ecology, diet and socialisation patterns among West Pashtuns in Afghanistan and on the ecology, diet and economy of nomadic Gujar and Bakkarwal in Kashmir – and has published extensively on various aspects of environmental management, nutrition, and risk evaluation. Together with Aparna Rao he was chairperson of the *Commission on Nomadic Peoples* of the *International Union of Ethnological and Anthropological Sciences* (1995–1998), and is one of the editors of *Nomadic Peoples*, the official journal of the Commission. Formerly at the Department of Psychology, University of Zurich, and at the Departments of Anthropology at the Universities of Göttingen, Hamburg and Münster, he is now Professor of Social Anthropology, Institut für Völkerkunde, Cologne University.

**CREED, Hilary.** Dr. Hilary Creed-Kanashiro, nutritionist, has worked in infant and family nutrition in Perú for the last 30 years. She has conducted studies to assess infant and family food and nutrient intakes in different parts of the country and conducted community-based

and health facility-based intervention research to improve infant feeding and the dietary intake of women of reproductive age. She is with the Instituto de Investigación Nutricional in Lima, Perú.

**DEMMENT, Montague.** Professor Montague Demment began his international career as a Peace Corp Volunteer in Ethiopia which changed his interests from architecture to ecology. He received his BS degree from Harvard (Architectural Sciences) and MS and PhD degrees from the University of Wisconsin (Zoology). He presently is a professor of range ecology at UC Davis and director of the Global Livestock CRSP. He is also president of the Association for International Agriculture and Rural Development, chairs the International Agriculture Coordinating Committee for the National Association of State Universities and Land Grant Colleges and was director of the UC Davis Sustainable Agriculture Program and the Long Term Research on Agricultural Systems Project (100 year experiment in Mediterranean cropping systems). His research focus is on the nutritional ecology of herbivores. His work has linked physiological constraints of metabolism and digestion to behavioral responses of animals in their selection of foods. He has published papers on comparative ecology of animals from mice to elephants including humans.

**GEWA, Constance.** Ms. Gewa is from Kenya, holds a BSc in Nutrition from Egerton University and MSc in Applied Nutrition from the University of Nairobi. She served as a senior field nutritionist in the Global GLCRSP Nutrition Project in Embu, Kenya. Currently she is in the doctoral program at UCLA in the Department of Community Health



Sciences with her focusing on validation of nutrition of food intake methodologies.

**GIBSON, Rosalind.** Professor Rosalind Gibson began her nutrition research career in Ethiopia, testing a complementary food developed by the Ethio-Swedish Children's Nutrition Unit. She has a Masters degree from UCLA and a PhD from the University of London for research on the trace element status of preterm and full term infants. At the University of Guelph, Canada, Prof. Gibson undertook research which provided the country's first quantitative evidence that a growth-limiting zinc deficiency syndrome existed in school-aged boys. Prof. Gibson went on to research the importance of dietary-induced suboptimal zinc status and its association with stunting in Papua New Guinea, Malawi, Guatemala, and Ghana. Prof. Gibson is now at the University of Otago in New Zealand and is working on the development of sustainable food-based strategies to combat micronutrient deficiencies in developing countries. She authored a textbook and laboratory manual on Nutritional Assessment and is the author or co-author of more than 120 refereed scientific papers.

**GITTELSON, Joel.** Dr. Joel Gittelsohn, Associate Professor, Center for Human Nutrition, Department of International Health, is a medical anthropologist at the Johns Hopkins University Bloomberg School of Public Health. Dr. Gittelsohn has conducted extensive research in the area of intrahousehold food allocation and household dynamics. His dissertation in the rural hills of Nepal in 1986-7 was one of the first studies to systematically examine patterns of intrahousehold food

allocation through direct observation of meals, quantifying both behavior and food quantities.

Dr. Gittelsohn specializes in the use of qualitative and quantitative information to design, implement and evaluate health and nutrition intervention programs. Dr. Gittelsohn integrates qualitative and quantitative approaches to better understand culture-based health beliefs and behaviors, and how these factors influence the success or failure of lifestyle (diet, activity, tobacco use) modification strategies. He is currently a co-investigator on a project aimed at preventing obesity in African American children in Baltimore City using home visit interventions.

**GRILLENBERGER, Monika.** Monika Grillenberger is a Ph.D. fellow at the division of Human Nutrition and Epidemiology at Wageningen University, the Netherlands. She started her Ph.D. in 1998 within the GL-CRSP research project 'Role of Animal Source Foods to Improve Diet Quality, Growth and Cognitive Development in East African Children', Embu, Kenya. The project is a collaboration between University of Nairobi, Kenya, University of California, Los Angeles and University of California, Davis, USA. Monika Grillenberger studied Human Nutrition at Justus-Liebig-University, Giessen, Germany. During her studies she did internships at the Research Institute for Health Sciences, Chiang Mai University, Thailand and at the Deutsche Gesellschaft fuer Technische Zusammenarbeit GTZ (German bilateral aid agency), Eschborn, Germany. Her MSc thesis was based on work in a development project in Guinea, West Africa. After her studies, she worked at the Division of Applied Human Nutrition, University of Nairobi, Kenya.

**GUTHRIE, Donald.** Dr. Guthrie is Emeritus Professor in the Department of Biobehavioral Science and Biostatistics at UCLA, School of Medicine and Public Health. Dr. Guthrie has been a long-time collaborator with the Nutrition CRSP and GLCRSP Child Nutrition project and is very experienced in the analyses of cognitive and child development data. Dr. Guthrie also has extensive experiences with longitudinal data analyses.

**HARDINSYAH, H.** Dr. Hardinsyah, MS. PhD., is currently the Executive Director of the Center for Food and Nutrition Policy Studies, Bogor Agricultural University (PSKPG IPB)-Indonesia, and Secretary of the National Advisory Board for Food Security. In addition, he is a Vice Chairman of the Nutrition Society of Indonesia. Prior to his current position, he served as the Head of the Department of Community Nutrition and Family Resources, Bogor Agricultural University, and Secretary-General of Food and Nutrition Society of Indonesia. He received his PhD in Nutrition from the Nutrition Program, Medical School, University of Queensland - Australia. He was trained in food policy analysis at Cornell Food and Nutrition Policy Studies, Cornell University. His research interest is in Nutritional Epidemiology especially in maternal and child nutrition, dietary behaviour, and food and nutrition policy analysis.

**HOP, Le Thi.** Dr. Le Thi Hop is Director of the Food and Nutrition Training Center at the National Institute of Nutrition in Hanoi, Vietnam. She has a medical degree from the Tashkent Medical College in the former Soviet Union, and holds an MS and PhD. in Community Nutrition from the SEAMEO-TROPMED Center, University of

Indonesia, Jakarta. Her research activities include a longitudinal study on growth and development of Vietnamese children living in Hanoi, and an assessment of the nutritional status of pregnant and lactating women in Hanoi and some rural areas of Vietnam.

**LARSEN, Clark S.** Clark Spencer Larsen is a Distinguished Professor of Social and Behavioral Sciences and Chair of the Department of Anthropology at Ohio State University. He received his B.A. in anthropology from Kansas State University (1974), and holds an M.A. (1975) and Ph.D. (1980) in biological anthropology from the University of Michigan. He is currently the Editor-in-Chief of the *American Journal of Physical Anthropology* and the past president of the American Association of Physical Anthropologists.

Larsen's research is primarily focused on biocultural adaptation in the last 10,000 years of human evolution. He is the co-director of the *Global History of Health Project*, an international collaboration involved in the study of ancient skeletons from all continents in order to track health changes since the late Paleolithic. A key area of interest is the impact of the transition from hunting and gathering to agriculture on human health in ancient societies. He is the author of many articles and books, including *Bioarchaeology: Interpreting Behavior from the Human Skeleton* (Cambridge University Press, 1997).

**MARETZKI, Audrey N.** Dr. Maretzki is a community nutrition educator with a particular interest in the ability of local food systems in the US and developing countries to respond to the needs of low-income households. From 1992 through 1999 she directed the USAID-funded

NutriBusiness Project in Kenya. In 2001 she spent a six-month sabbatical in the Nutrition Programmes Service at FAO headquarters in Rome. There she established a multi-disciplinary NutriBusiness Working Group and prepared guidelines for countries that would like to implement NutriBusiness projects. With colleagues from Penn State, FAO, the University of Namibia and Women's Action for Development, a Namibian NGO, she prepared a NutriBusiness proposal for Namibia that is currently under review by the Association Liaison Office for International Cooperation in Development. In 1997, Dr. Maretzki received the Penn State Faculty International Award based largely on her work in Kenya and in 2002 she was recognized for her community-based work by her selection to receive the Penn State Faculty Outreach Award. On the domestic front, Dr. Maretzki leads the Northern Appalachia Cancer Network and is the Principal Investigator for both the Pennsylvania Nutrition Education Network and the Pennsylvania Food Stamp Nutrition Education Program.

**MILLS, Edward W.** Dr. Mills is Associate Professor of Dairy and Animal Science with a courtesy appointment in Food Science at Pennsylvania State University. He is also a member of the interdepartmental Graduate Program in Nutrition. Dr. Mills joined the faculty at Penn State in 1988 after serving on the Food Science faculty at Purdue University and working for two years as Manager of Technical Services for Wilson Foods. He teaches courses in Meat Science, Muscle Foods Processing Technology and Comparative Animal Physiology. Dr. Mills conducts research in meat science and muscle physiology with current focus

on low fat and reduced fat meat products, control of lipid oxidation in precooked meat products and application of NIR spectroscopy and ultrasound for prediction of meat quality and palatability. Dr. Mills is past chairman of the Intercollegiate Processed Meat Products Clinic sponsored by the American Meat Science Association and the American Meat Institute.

**MILTON, Katharine.** Dr. Milton is a professor in the Dept. of Environmental Science, Policy & Management, University of California-Berkeley. She was trained as a biological anthropologist. She carries out research on the dietary ecology of remote tropical forest human societies and the food choices and nutritional composition of plant foods of wild non-human primates. She is particularly interested in the role played by diet in human evolution.

**MURPHY, Suzanne.** Dr. Murphy is a research nutritionist with the Cancer Research Center at the University of Hawaii, USA. She holds a doctorate in nutrition from the University of California at Berkeley. She was an investigator with the Management Entity for the Nutrition Collaborative Research Support Program (NCRSP) from 1985 till 1992, and is currently a co-investigator for the GL-CRSP study of animal source foods and cognitive development in Kenya. She also worked with several of the panels and subcommittees of the Food and Nutrition Board that are setting the new Dietary Reference Intakes. She has a long-standing interest in the associations among dietary patterns, nutrient adequacy, and health outcomes.

**NEUMANN, Charlotte.** Professor Neumann holds a M.D. and MPh in Maternal and Child Health and Nutrition. She is in the Department of Community Health Sciences in the UCLA School of Public Health and the Department of Pediatrics in the UCLA School of Medicine. Dr. Neumann has been P.I. and Co-Investigator on numerous field studies on the interaction of nutrition and infection and immune function as well as the function outcomes of both energy and micronutrient deficiencies. Her fieldwork has been in India (Punjab), Ghana, Uganda, and Kenya, where she has worked for the past 20 years. She is a long time collaborator with Dr. Nimrod Bwibo since 1978. Dr. Neumann has published extensively in the areas of interaction of malnutrition and child growth and development.

**POPKIN, Barry M.** Dr. Popkin is a Professor of Nutrition at the University of North Carolina – Chapel Hill (UNC-CH) where he heads the Division of Nutrition Epidemiology in the School of Public Health. He has a PhD in economics. His research focuses on dynamic changes in diet, physical activity and inactivity and body composition and the factors responsible for these changes as well as some consequences and program and policy options for change. Much of his work on the nutrition transition focuses on the rapid changes in obesity. He is actively involved in research in the US and a number of other countries around the world. Included are detailed longitudinal studies that he directs in China and Russia, active involvement with longitudinal studies in the Philippines and related work in Brazil and several other countries. Dr. Popkin serves on several scientific advisory organizations

including Chair, the Nutrition Transition Committee for the International Union for the Nutritional Sciences.

**QUANINE, Jannat E.** Mrs. Jannat-E-Quanine is the Project Director of Kosovo Grameen- Missione Arcobaleno Microcredit Fund (KGMAMF) Project in Kosovo. She is originally from Bangladesh. Before taking this responsibility she was the Chief of the International Program Department of Grameen Bank at the head office in Bangladesh. Mrs. Jannat is a Deputy General Manager of Grameen Bank, Dhaka Bangladesh. She is number four out of more than 10,000 staff in Bangladesh, Grameen Bank. Mrs. Jannat has been with the Bank since its inception when Prof. Muhammad Yunus (The founder of Grameen Bank), started to work in one village. Today Grameen Bank is working in more than 41,000 villages of Bangladesh. She has more than 24 years of micro credit experience and took many important missions and responsibilities at home and abroad including different countries of the world in Asia, Europe, Africa, North America, South America etc.

**RIVERA, Juan A.** Dr. Juan A. Rivera Dommarco trained as a nutritionist at the Universidad Iberoamericana in México City. He has an M.S and a Ph.D. in International Nutrition from Cornell University. He worked at INCAP/PAHO from 1987 to 1993, where he was appointed as Head of the Division of Nutrition and Health from 1990 to 1993. In 1993 he returned to Mexico where he joined the National Institute of Public Health, with the specific objective of developing a Nutrition Unit. He is currently the Director of the Center for Research in Nutrition and Health. He has approximately 90 publications, including

articles, books and book chapters and has published over 120 abstracts of presentations in scientific meetings.

He is a Professor at the Mexican School of Public Health, at the Division of Nutritional Sciences in Cornell University and at the Rollins School of Public Health at Emory University. He is a member of the Technical Committee of the Nutrition and Food Network of the Mexican Federal Government, and of the Nutrition Advisory Committee at PAHO, and is Co-Chairman of the International Zinc Nutrition Consultative Group, and Council of the IUNS.

**ROOS, Nanna.** Dr. Roos works on a consultancy basis for the Research Department of Human Nutrition, The Royal Veterinary and Agricultural University, Denmark. She is also doing a consultancy for IFPRI in connection with a workshop on agriculture and malnutrition in Bangladesh. Trained as a biologist specializing in aquatic ecology and aquaculture in developing countries, Dr. Roos received her Ph.D. in human nutrition in developing countries from The Royal Agricultural and Veterinary University, Denmark.

Her research interests the role of fish in food- and nutrition security in developing countries with emphasis on fish as a dietary source of vitamin A and minerals in rural areas in Asia (Bangladesh, Cambodia) and rural aquaculture and the development of aquaculture technologies that meet the needs of poor small-scale farming households, particularly the development of culture technologies of micronutrient dense indigenous fish species.

**RUEL, Marie T.** Marie T. Ruel is a Senior Research Fellow at the International Food Policy Research Institute (IFPRI) in

Washington, D.C. At IFPRI, Dr. Ruel leads a multi-country research program to analyze the food security and nutrition implications of rapid urbanization in developing countries. One of her areas of emphasis is to develop indicators and methods to measure child feeding practices and other aspects of child care. She also conducts applied research in program evaluation and nutrition policies. Her work in this area includes both operational and impact evaluation, and combines the use of qualitative and quantitative approaches. She is also involved in research in the area of micronutrient deficiencies, with a main emphasis on dietary diversity and food-based strategies.

Dr. Ruel earned a Ph.D. in international nutrition from Cornell University. Before joining IFPRI in 1996, she was head of the Nutrition and Health Division of the Institute of Nutrition of Central America and Panama/Pan American Health Organization (INCAP/PAHO) in Guatemala, where she worked for 6 years.

**SMITASIRI, Suttalak.** Dr. Smitasiri received a bachelor of photographic science and printing technology from Chulalongkorn University and two master degrees in development communication from Chulalongkorn University, Thailand and applied communication research from Stanford University, USA. In addition, she received a doctoral degree in community nutrition from University of Queensland, Australia. As Head of the Division of Communication and Behavior Science at the Institute of Nutrition, Mahidol University, her interests and experiences lie in developing innovative nutrition education/communication technologies including

social marketing and processes for nutritional behavior development. She received the Ceres Queen Sirikit Gold Medal for her outstanding contribution to nutritional well-being in Thailand presented by the Food and Agriculture Organization (FAO) in 1992 and Mahidol University's Outstanding Research Award in 1994. She has served as a member of the steering committee for the International Vitamin A Consultative Group since 1992 and a member of ACC/SCN high commission for nutrition in 21<sup>st</sup> century between 1997-2000. She has also worked with international agencies i.e. WHO, UNICEF, and development banks to support nutrition work in other Asian countries.

**SPEEDY, Andrew W.** Dr. Speedy is Senior Officer (Feed and Animal Nutrition), Animal Production and Health Division, at the Food and Agriculture Organization of the United Nations in Rome, Italy. He is head of the Feed Resources Group in FAO and responsible for feed information, publications, national and international projects, relief operations and advice to Member Countries. He has held this post for 4 years but has worked with FAO for more than 10 years before, as a consultant, developing the extensive Animal Feed Resources Information System (Tropical Feeds) as a computerized system. He has written and edited many books on feed and animal nutrition and published papers and reviews in scientific journals. He has worked in many countries in Latin America, Africa, South and South-East Asia, as well as Europe.

He completed his first degree in agricultural science at Cambridge in 1969 and went on to undertake his PhD at Cambridge in animal nutrition and

production. He spent 9 years (1972-81) at the East of Scotland College of Agriculture as Specialist Adviser in the Animal Production Advisory and Development Department. From 1981-1998, he taught in the University of Oxford and was Official Student (Tutorial Fellow) in Agriculture and Biological Sciences at Christ Church, Oxford. In 2001, he was elected an Emeritus Student of Christ Church.

**WHALEY, Shannon E.** Shannon E. Whaley, Ph.D. has been an Assistant Research Psychologist in the Departments of Psychology and Psychiatry at UCLA since completing her doctoral work in developmental psychology in 1998. Her primary research interests are in the areas of risk and resiliency and investigating factors that optimize children's developmental trajectories. In addition to her work in Kenya exploring nutritional factors related to children's behavioral and cognitive outcomes, Dr. Whaley has an active research program designed to curb alcohol use during pregnancy among low-income women in Los Angeles, California. She also works closely with the WIC Program in Los Angeles County, designing interventions for low-income families that optimize the literacy and mental health of this population.

## STUDENT POSTER PRESENTATIONS

*Student authors of the following posters successfully competed for travel grants enabling them to attend and present their work at this conference.*

**TITLE:** *Participants in a Home Garden Program in Rural Nepal Have Better Nutrition Knowledge and Practices than Non-Participants.*

**AUTHORS:** Katharine M. Jones<sup>1</sup>, Sheila Specio<sup>1</sup>, Parvati Shrestha<sup>2</sup>, and Lindsay Allen<sup>1</sup>

<sup>1</sup>Program in International Nutrition, University of California, Davis. <sup>2</sup>Chemonics/MARD Project, Nepal

**ABSTRACT:** Chemonics/MARD Projects, Nepal Food-based nutrition interventions, including home gardens and nutrition education, potentially offer a sustainable approach to reducing multiple nutritional deficiencies but have been poorly evaluated in developing countries. We evaluated the impact of an agricultural development project that included home gardening, nutrition education, training, technical assistance and seed distribution. Project activity was initiated 36 months prior to evaluation but the home gardening component was added after 30 months only. A cross sectional survey was implemented in 819 households in rural Nepal. Participant households (n=430) were compared to non-participants (n=389). Households participating had more nutrition knowledge ( $p < 0.001$ ) and were more likely to feed colostrum ( $p < 0.005$ ), feed special complementary foods to infants ( $p < 0.05$ ), and preserve food ( $p < 0.005$ ). There were no differences in utilization and consumption of animal products between groups, but participating households produced and consumed more micronutrient rich vegetables and fruits ( $p < 0.005$ ). A trend of better knowledge and practices was observed in training session attendees. We conclude that nutrition education and home gardening can improve household nutrition knowledge and practices in this population.

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**TITLE:** *Food Insecurity and Malnutrition Among the Rendile Community of Marsabit, Kenya: Part Review of the Status and Interventions to Alleviate the Problem.*

**AUTHOR:** Simon G. Kuria, University of Nairobi, Kenya.

**ABSTRACT:** Rendille is one of the pastoral communities of Kenya living in the lowlands of Marsabit administrative district. The community traditionally kept camels and small stock, and relied on the livestock products (milk, meat and blood) for subsistence. However, recent developments indicate that both life styles and food habits of the community are fast changing. This paper reviews some of the factors prompting the changes, implications of the changes on the community food security and nutrition as well as some of the interventions to mitigate the negative effects of the changes. In the recent past, environmental and demographic among others changes have occurred in the area. Frequent droughts in particular have kept the livestock out of reach by many and more vulnerable household members namely, young children, pregnant and lactating mothers. Rising human population has aggravated the situation. These factors have forced the community to adopt food grains, vegetable oils, tea etc. These foods are not only nutritionally inferior to animal source foods but the community does not have means or know how to prepare them. The result has been increased food insecurity and cases of malnutrition. Non-governmental organizations operating in the area have intervened by supplying relief foods some of whose problems are already highlighted. Relief supplies have not only created dependency syndrome but have also made the community neglect livestock, and is unsustainable. Kenya Agricultural Research Institute (KARI), which is operating in the area, has introduced research interventions to reverse declining trends and improve livestock performance. This seem to be the only sustainable way of supplying adequate and quality foods that would guarantee food security for the community.

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**TITLE:** *Poultry as a Potential Animal Source Food for Settled Households Among Pastoral Communities in Northern Kenya.*

**AUTHORS:** Immaculate Nduma<sup>1</sup>, H. Maina Warui<sup>2</sup>, Chris Onyango<sup>1</sup> and A.A. Aboud<sup>1</sup>

<sup>1</sup>Egerton University, Njoro, Kenya. <sup>2</sup> Natural Resources Management Section, National Arid Lands Research Center, Kenya Agricultural Research Institute (KARI), Kenya.

**ABSTRACT:** Over the past three decades, sedentarization among the pastoralist communities of East Africa has been widespread. In northern Kenya this change of livelihood has been aggravated by prolonged and recurrent droughts. Distribution of relief food in the form of yellow maize and occasionally beans and oil is a common phenomenon among settled households. When nomads settle their traditional sources of protein including milk, meat and blood are constrained by grazing facilities. Settled households send most of their livestock to satellite camps in order to access remote rangelands. This translates to low protein content in the diet of members of the household in the settled camp who are mainly women, children and the old. Settled female pastoralists have limited food and income options and low access and control over the traditional animal source foods from small stock which are a men's reserve. Milk sharing which traditionally was a woman's mandate is increasingly in the hands of *morans* (warriors) in the satellite camps. Strengthening the capacity of these households to be self sufficient in animals source foods can be by way of supplementing the existing monoculture that heavily relies on the livestock resource base (ruminants).

In on-going studies under EU-KARI ARSP<sup>5</sup>, 21% of the sampled households (n=238) in the Rendile area of Korr, and 40.5% around the Marsabit mountain area (n=205) in Marsabit District have diversified their livelihood strategies to keeping of poultry. Women and children from livestock poor and/or female-headed households are principal participants. It is an enterprise in its rudimentary stages that has the potential to be an alternative and/or additional source of animal source foods for settled households among pastoral communities in northern Kenya about which women can make quick decisions without necessarily consulting their husbands. Furthermore, the activity would be accompanied by nutritional education to counter cultural beliefs, misconceptions and taboos associated with poultry among pastoral communities and so increase acceptability of chicken meat and eggs. Money obtained from sales of live birds and eggs may promote income levels, acquisition of assets and improve the material situation of settled households. It has potential as a strategy for poverty-alleviation for settled pastoral women.

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**TITLE:** *Supplementation with Beef or Milk Markedly Improves Vitamin B<sub>12</sub> Status of Kenyan Schoolers.*

**AUTHORS:** ED Reid<sup>1</sup>, JH Siekmann<sup>1</sup>, NO Bwibo<sup>2</sup>, CG Neumann<sup>3</sup>, LH Allen<sup>1</sup>

<sup>1</sup>Program in International Nutrition, University of California, Davis. <sup>2</sup>Pediatrics, University of Nairobi, Kenya. <sup>3</sup>School of Public Health, University of California, Los Angeles.

**ABSTRACT:** Food intake data, collected in 1984-1987, showed vitamin B<sub>12</sub> intake was low for Kenyan schoolers. In 1998, a 2-year randomized intervention with animal products was initiated to improve micronutrient status of 6-9 year old rural Kenyans. Twelve schools were randomly assigned to 4 groups; control or equicaloric amounts of githeri (a maize and bean staple) containing added oil, beef or milk provided as a mid-morning meal, 5d/wk in school. Compared to the control group, in years 1 and 2 respectively, plasma B<sub>12</sub> (ng/L) increased by 55 (p=0.0145) and 201 (p < 0.0001) in the meat group; 84 (p=0.0013) and 126 (p=0.0001) in the milk group; and did not change in the oil group. The increase in the meat group was significantly greater than in the milk group at the end of year 2 (p=0.0017). At baseline, 38% of the children had severe (< 200 ng/L) and 30% had moderate (200-300 ng/L) deficiency. After 2 years, in the meat and milk groups severe deficiency was almost eliminated (p < 0.0001). Because it was alleviated by supplementation with small amounts of animal products, the cause of the highly prevalent B<sub>12</sub> deficiency appears to be low intake and not malabsorption of the vitamin from food. (Funded by USAID PCE-G-00-98-000036-00 to the Global Livestock CRSP).

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## POSTER PRESENTATIONS

**TITLE:** *Safety Assessment and Sensory Analysis of a Meat-Based Dried Snack Food.*

**AUTHORS:** Stephen Kieras<sup>1</sup>, Audrey Maretzki<sup>1</sup>, Stephen Knabel<sup>2</sup>, and Edward Mills<sup>1</sup>

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**ABSTRACT:** The “Chiparoo<sup>TM</sup>” is an ASF designed for local production in African countries where households do not slaughter livestock for family consumption and young children are consequently deprived of this source of essential micronutrients. Chiparoos are made from rabbit or chicken meat combined with either white or sweet potatoes. Studies were conducted to assess the safety and acceptability of Chiparoos. The first study evaluated the ability of the Chiparoo manufacturing process to adequately deliver 5 log 10 reductions in *Listeria monocytogenes*, *Escherichia coli* 0157:H7, *Salmonella typhimurium*, and *Staphylococcus aureus*. The second study assessed the ability of the manufacturing process to inhibit *Staphylococcal enterotoxin* production. The third study involved product sampling in two rural Kenyan villages where mothers and children indicated their relative preference for four different Chiparoo varieties. The recommended manufacturing process, involving the addition of lemon juice to the meat-potato mixture before drying, produced a safe product that was acceptable to Kenyan consumers.

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**TITLE:** *The Global Livestock CRSP — Managing Risk in an Unpredictable World.*

**AUTHOR:** Dr. Montague Demment, Global Livestock CRSP, University of California - Davis.

**ABSTRACT:** The Global Livestock Collaborative Research Support Program (GL-CRSP) is addressing important topics in the international livestock development sector. The program, comprised of broad-based interdisciplinary projects, focuses on human nutrition, economic growth, environment and policy linked by a global theme of agriculture at risk in a changing environment. The program is a collaborative effort involving researchers from US universities, international agricultural research centers and foreign institutions. Currently, the program is active in three regions of the world: East Africa, Central Asia and Latin America.

The GL-CRSP builds effectively on complementarities between projects in different regions. Centered on a theme of managing risk in our unpredictable world, the program is developing the capacity to predict risk so it can be better managed, improving the tools to cope with risk, and contributing to the mediation of risk.

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**TITLE:** *Food Insecurity in Latin-American Rural Villages: A Qualitative Assessment*

**AUTHORS:** Hugo Melgar-Quíñonez, MD, Ph.D.<sup>1</sup>, Ana Claudia Zubieta, Ph.D.<sup>1</sup>, Timothy C. Moermond, Ph.D.<sup>2</sup>

<sup>1</sup>Department of Nutrition, University of California, Davis

<sup>2</sup> International Agricultural Programs, University of Wisconsin-Madison

**ABSTRACT:** Auto-diagnostic studies completed between 1997-2000 by Project PLAN (Community Planning for Sustainable Livestock-based Forested Ecosystems in Latin America; *Planificación Local Agropecuaria y de la Naturaleza*) revealed low quality diets, malnutrition and food insecurity in rural communities in Bolivia, Ecuador, and México. In 2001, a qualitative assessment (focus groups, transect walks and in-depth interviews) was carried out in nine communities to learn about dietary practices and local perceptions in regards to food insecurity, its causes and consequences for the families, the implemented coping strategies to confront this phenomenon, and alternative interventions identified as ways of improving the local food supply and dietary quality. Results showed that food insecurity in the nine communities is consistent with the conceptual framework of food insecurity as a managed process where families develop diverse strategies to cope with a series of periodic events. Food insecurity was associated with anxiety and desperation, unemployment, and a general lack of resources. Animal breeding is a common practice where families experiment with a wide range of species. Although animal products are highly valued they are not consumed on a regular basis and are mainly used to cover outstanding expenditures (e.g. medical emergencies, celebrations). Few families own vegetable gardens but those who do, lack resources to diversify the production and to protect against animal intruders. Despite the high level of participation and organization of the women in comparison to men, women have less access to land, education, credit and technology and they suffer an unequal intra-household food distribution. Food-based intervention projects are being carried out by the PLAN work teams in the three countries. These interventions require a family-approach and are based on a strong community participation perspective. (Funded by USAID PCE-G-00-98-000036-00 to the Global Livestock CRSP).

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**TITLE:** *Small Animal Revolving Fund Improves Access to Heme Iron in Malawi.*

**AUTHORS:** Kendra Siekmans<sup>1</sup>, Sonia Blaney<sup>1</sup>, and Rose Namarika<sup>2</sup>

<sup>1</sup>World Vision Canada. <sup>2</sup>World Vision Malawi

**Objective:** To reduce iron deficiency in Malawi through an innovative strategy that increases household access to animal source foods.

**Background:** The goal of the MICronutrient And Health (MICA<sup>H</sup>) program is to improve the micronutrient and health status of women and children through integrated and sustainable interventions.

**Method:** Baseline survey results (1996) indicated 94% of children under five and 59% of pregnant women were anemic. Given this high prevalence of anemia, low availability of animal protein and consumption of high phytate food staples (maize), MICA<sup>H</sup> focused on promoting small animal production and consumption to increase home iron intake and enhance absorption of non-heme iron. Women in communities identified small animals (poultry, rabbits, guinea fowl) as those livestock over which they have control, and therefore are best suited to providing meat to their families. Animals are given to households and the offspring distributed in a revolving fund manner. The management of repayments "in kind" is the responsibility of the communities.

**Results:** A follow-up survey (2000) showed a large increase in the percentage of households with livestock from baseline (40%) to follow-up (69%). Moderate impact was seen with anemia levels, decreased among pregnant women to 43% and among children under five to 80%.

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