PROCEEDINGS

Brainstorming
on
Climate Change: Animal Production and Health, Challenges and Way Forward

11th December, 2019

DEPARTMENT OF VETERINARY PHYSIOLOGY

College of Veterinary Science and A.H.

U.P. Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan
Vishwavidyalaya Evam Go-Anusandhan Sansthan
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Proceedings of Brainstorming on Climate Change: Animal Production and Health, Challenges and Way Forward

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Year: 2020

Edition: First

Publisher: Department of Veterinary Physiology, College of Veterinary Science and Animal Husbandry on behalf of UP Pt. Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go- Anusandhan Sansthan, Mathura- 281001, U.P., India

The information presented in this compilation is based on the discussions during the Brainstorming held on 11.12.2019 at College of Veterinary Science and Animal Husbandry, DUVASU, Mathura, U.P., India. The editors bear no responsibility with regard to the source, opinions and authenticity of the contents.

Printed and bound by : Kiran Computers & Printers, Aurangabad, Mathura

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of

Brainstorming
on
Climate Change: Animal Production and Health, Challenges and Way Forward

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DETAILED TECHNICAL PROGRAMME

Brainstorming
on
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8.15- 9.00 AM	Visit of goat semen production, analytical and certification laboratory			
9.00- 9.30 am	Inaugural Session	Welcome Address: Chief Guest: Hon'ble Vice Chancellor Dean, COVS and AH Introduction of Participants		
	Title of Session	**Theme speaker**	**Moderator**	**Assistant Moderator**
Session I 9.30 -11.30 AM	Bio-meteorological perspective of climate change	Dr S C Bhan Scientist F IMD, Delhi	Dr Ravindra Kumar, Director Research, BASU, Patna	Dr Madhu Tiwari Asst. Professor, AGB, DUVASU, Mathura
11.15 -11.30 AM	Hi-Tea			
11.30-11:45 AM	Visit of Bio-climatology laboratory			
Session II 11.45 AM - 1.15 PM	Vulnerability of Indian livestock to climate change	Dr Sejian V SS, NIANP, Bengluru	Dr SMK Naqvi Former-Director, CSWRI	Dr Vijay Pandey Associate Prof.Vet. Biochemistry
1.15-2.00 PM	Lunch			
Session III 2.00 – 4.00 PM	Methane emission from livestock and its mitigation	Dr LC Chaudhary Principal Scientist	Dr Sultan Singh IGFRI, Jhansi	Dr Vinod Kumar Associate Prof. Animal Nutrition
4.00- 4.15 PM	Visit of sperm signaling laboratory			
4.15 - 4.30 PM	Tea			
4.30 - 5.30 PM	Plenary session	Chairman: Prof. S. K. Garg, Acting Vice Chancellor, DUVASU Co-chairman: Dr Atul Saxena, Director Research, DUVASU Dr Sarvajeet Yadav, Director Extension,DUVASU Rapporteur: Dr. A. K. Madan, Prof. and Head, Vet. Physiology		
5.30 -5.35 PM	Vote of Thanks	Dr. Brijesh Yadav, Organizing Secretary		

INVITED PANELISTS

S. No.	NAME OF THE DELEGATE
1	**Dr. SC Bhan** Scientist F, Indian Meteorological Department New Delhi
2	**Dr. Sejian V** Senior Scientist, National Institute of Animal Nutrition and Physiology, Bangaluru
3	**Dr. Sohanveer Singh** Principal Scientist, Division of Animal Physiology, NDRI, Karnal
4	**Dr. SMK Naqvi** Principal Scientist, Animal Physiology, CSWRI, Avikanagar
5	**Dr. Sultan Singh** Principal Scientist, Division of Animal Nutrition, IGFRI, Jhansi
6	**Dr. R Kumar** Director Research, Bihar Animal Science University, Patna
7	**Dr. Gyanendra Singh** Principal Scientist, Division of Physiology and Climatology, IVRI, Bareilly
8	**Dr. LC Chaudahry** Principal Scientist, Division of Animal Nutrition, IVRI, Bareilly
9	**Dr. RS Bhatt** Principal Scientist, Division of Animal Nutrition, CSWRI, Avikanagar
10	**Dr. Vijay K Bharti** Scientist E, DRDO, Leh
11	**Dr. Ashok Kumar** Principal Scientist, Division of Health, CIRG, Makhdoom, Mathura
12	**Dr. G Ramchandran** Senior Scientist, Div. of Physiology, Reproduction and Management, CIRG, Makhdoom
13	**Dr. FA Khan** Principal Scientist, Division of Parasitology, CSWRI, Avikanagar

PARTICIPANTS FROM UNIVERSITY

Registrar, Deans of the colleges, Directors, all HoDs/Incharges and faculty from departments of Veterinary Physiology, Animal Nutrition, LPM, AGB, Clinical Veterinary Medicine, Veterinary Public Health, Veterinary Epidemiology, Veterinary Pathology, Veterinary Patholgy, Veterinary Parasitology and other interested faculty members participated in the panel discussion.

MODE OF BRAINSTORMING

In all the three sessions a theme paper was presented. Further a moderator assisted by an assistant moderator started the panel discussion in which all the panelists shared their experiences and views which was summed up at the end of the session by moderator. The participants deliberated on the theme paper as well as pointed out the gaps in knowledge.

VISIT OF THE LABORATORIES

During the brain storming session, the delegates were apprised about the state of art facilities developed in the Department of Veterinary Physiology and they wished to visit the laboratories to have ideas and information regarding the equipments and research going in these laboratories. The morning visit was to Goat Unit and laboratories being led by Dr. Mukul Anand. Dr. Anand briefed about the goat rearing, breeds, semen collection, processing and straw production for executing artificial insemination. The establishment involves semen processing and production units, proteomic and genomic facilities along with flow cytometry and imaging services. The set up is unique in India and is of first kind to have the world class facilities for research and development. Delegates visited Bio-Climatology lab being led by Dr. Brijesh Yadav and interacted with him regarding the lab and its functionality. The lab is well equipped with genomic, proteomic facilities of world standard along with Psychrometric and Calorimetric units which are unique in India. Dr. Brijesh Yadav briefed about the research regarding adaptability in different breeds of cattle, buffalo and goats. The third visit was to Sperm signaling laboratory being

led by Dr. Dilip Kumar Swain. The laboratory is equipped with CASA for sperm analysis along with imaging facilities. Dr Swain briefed about work in the area of basic sperm physiology and how ion channels are regulating spermatozoa function.




Session-I: Bio-meteorological perspective of climate

Theme Speaker: Shri S.C. Bhan, Scientist F, Indian Meteorological Department, New Delhi

Moderator: Dr Ravindra Kumar, Director Research, Bihar Agriculture University, Patna

Assistant Moderator: Dr Madhu Tiwari, Assistant Professor, Dept. of AGB, DUVASU

The theme speaker underlined the importance of bio-meteorological variables in animal production system. Based on the IMD data it was informed that the surface temperature has increased by 0.7 °C in the last century in India. Though increase in surface temperature has been observed during whole year, but the quantum of increase is higher during the colder months of the yearthereby indicating that the duration of heat stress during the year has increased. Increase in

relative humidity and decrease in average wind speed in different month of the year is major cause of concern in the animal production system. The most important manifestation of climate change experienced by animals is extremes observed in meteorological variables. Although different managemental strategies are in place, dissemination of early warning system about weather may play a significant role in reducing the effect of weather extremes on livestock production system.

Recommendations

1. Climate change is a continuous process, so the focus should be on understanding the effect of climatic variables on animal production and reproduction.
2. To overcome climate stress, shelter management using local resources needs to be devised.
3. Rearing of indigenous breeds needs to be promoted.
4. Dissemination of advisory about local weather conditions will help in reducing production losses in animals.
5. Undergraduate curriculum needs to be strengthened to imbibe the students and other stakeholder about the climate change related issues.

Session-II: Vulnerability of Indian livestock to climate change

Theme Speaker: Dr. V. Sejian, Senior Scientist, ICAR-NIANP, Banglore

Moderator: Dr SMK Naqvi, Principal Scientist, ICAR-CSWRI, Avikanagar

Assistant Moderator: Dr Vijay Pandey, Associate Professor, Dept. of Veterinary Biochemistry, DUVASU

In this session discussion focused on debilitating effect of climate change on livestock and which is presently more pertinent for developing countries. The change in climate is not only natural but anthropological contribution is also enormous. The impact of climate change on livestock is direct as well as indirect. Further, the indirect effect is more important and significant. The climate change affects growth, production (milk and meat), reproduction and frequency and intensity of incidence of disease occurrence in animals. This is because climate change imposes nutritional (food and water stress), thermal and

walking stress on animals. It is emphasized that for evaluating the impact of stress on animals, multiple stresses (at least two) should always be considered. It is also emphasized that for assessing stress by THI index, other parameters should also be considered such as wind velocity and solar radiation which are included in Heat Load Index (HLI) and Accumulated Heat Load Units (AHLU). For mitigation of heat stress, proper housing and modified nutrition should be provided to the animals. Moreover breeding of well adapted animals having good production traits should be promoted.

One of the panelists opined that THI formula developed for one geographic region may not be always accurate for another geographic area and therefore THI formula may be designed for different agro-climatic zones in India. One of the panelists raised the question about the threshold THIs/upper Critical THI which can be used as a standard of indigenous domestic species to predict the stress level as it is still not clearly defined.

The effect of increase in environmental temperature on rumen temperature, its microbial population and bioenergetics has never been attempted and needs to be studied as it can help in modulating the rumen health and productivity in heat stress conditions.

Panelists discussed in detail about the adaptability and heat tolerance markers and opined that a group of markers may be identified to differentiate comparatively more adapted livestock breeds. The panelists also discussed the ever increasing economic losses due to reproductive failures in buffalo, cattle and even in small ruminants due to increase in heat stress duration and emphasized more upon nutritional, managemental and therapeutic strategies to minimize the economic losses.

One of the panelists raised concern about changing pattern of emerging, re-emerging diseases and arthropod and other parasite borne diseases in the changing climatic variables and stressed upon revisiting the preventive and therapeutic strategies.

Recommendations

1. Temperature humidity Indices (THI) for different geographical areas needs be formulated encompassing other climatic variables besides temperature and humidity and accordingly stress level needs to be redefined.
2. Adaptability marker should be standardized for assessing the adaptability of livestock.
3. Strategy should be identified for improving the livestock production under climate change scenario.
4. Rumen microbiota metagenomics should be studied to understand the nutrient utilization pattern during heat stress.

Session-III: Methane emission from livestock and its mitigation

Theme Speaker: Dr. L. C. Chaudhary, Principal Scientist, ICAR-IVRI, Bareilly

Moderator: Dr Sultan Singh, Principal Scientist, ICAR-IGFRI, Jhansi

Assistant Moderator: Dr Vinod Kumar, Associate Professor, Dept. of Animal Nutrition, DUVASU

Methane production during enteric fermentation is a matter of global concern in animal production system. Indian livestock have been blamed for polluting the environment because of their low productivity and higher methane production. Ruminants contribute about 1/6th to the methane pool and India rank 5th in its carbon dioxide emission. Since last few decades scientific community is striving hard on methane measurements and its mitigation strategies with variable success. Strategies like alternate hydrogen sink, elimination of methanogens or vaccination and use of different feed additives have been tried. But diversity of rumen microbes creates great challenge to rumen microbiologists as rumen environment changes with the diet, environment and any external intervention. Success of various feed additives is also not sustainable due to microbial plasticity. Therefore newer sustainable methane reduction strategies for ruminants need to be formulated.

Recommendations

1. Designing of feed and fodders with low fiber and soluble sugars high protein by introducing desirable traits is required by plant breeders.
2. Screening and isolation of certain pure form of compounds in plants for commercial use must be taken up as feed additive.
3. Precision feeding practices must be promoted to increase productivity and lower methane emission.
4. Attempt should be made to decrease number of unproductive animals through selective breeding and culling.

Overall recommendation of Brainstorming

1. Formulation of geographical area based Temperature Humidity Indices (THI) is recommended.
2. Adaptability marker should be standardized for assessing the differential adaptability of breeds of a particular livestock species for which collaborative research is recommended.
3. The basic data related to methane emission per unit production in different breeds of livestock species needs to be generated.
4. Rumen microbiota metagenomics should be studied to understand the nutrient utilization pattern during heat stress.
5. Under National Initiative on Climate Resilient Agriculture (NICRA) program of Government of India, Veterinary University Mathura should be included as one of the centers which is having state of art facility for conducting adaptability and methane emission studies besides having variety of farm animals.

Glimpses of Brain Storming

Department of Veterinary Physiology, COVS and AH, DUVASU, Mathura

11.12.2019











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