

# Buffal Newsletter



Number 36 December 2020

**BULLETIN OF THE FAO-SCORENA INTER-REGIONAL COOPERATIVE RESEARCH NETWORK ON BUFFALO AND OF THE INTERNATIONAL BUFFALO FEDERATION – INCLUDES SHORT COMMUNICATIONS, RESEARCH PAPERS, TECHNICAL NOTES, ONGOING RESEARCHES**

## Inside this issue

<b>UNCOMMON PHENOMENON IN BUFFALO</b> .....	3
<b>REPORT ON BUFFALO COAT COLOR</b> .....	5
<b>GENOME RESEARCH ON BUFFALO IN GERMANY</b> .....	7
<b>WATER BUFFALO IN THE UNITED KINGDOM</b> .....	9
<b>THE BRAZILIAN ASSOCIATION OF BUFFALO'S BREEDERS CELEBRATES ITS 60 YEARS</b> ..	11
<b>REPORT ON PAKISTAN INTERNATIONAL BUFFALO CONGRESS (IBC)-2019</b> .....	13
<b>CURRENT SITUATION OF BUFFALO IN CUBA</b> .....	15
<b>RESEARCH RESULTS FROM THE INSTITUTO DE CIENCIA ANIMAL (ICA)</b> .....	15
<b>ANASB (Italian Buffalo Breeders Association) SELECTION ACTIVITIES</b> .....	21
<b>RESEARCH TOPIC BUFFALO HEALTH AND PRODUCTION</b> .....	26
<b>IN FRONTIERS IN VETERINARY SCIENCE</b> .....	26
<b>UPCOMING EVENTS</b> .....	37
<b>10<sup>TH</sup> ASIAN BUFFALO CONGRESS 2021 (ABC 2021)</b> .....	37
<b>13<sup>th</sup> WORLD BUFFALO CONGRESS</b> .....	39
<b>MEMORIES</b> .....	40
<b>HÉCTOR ANTONIO SCANNONE POGGIOLI</b> .....	40
<b>CARLOS MARÍA DE LLANO</b> .....	42
<b>IBF ORGANIZATION</b> .....	43

The year 2020 was tragic for the planet as a war, as Covid 19 pandemia hit all the countries, killing a lot of people and destroying activities and economy. Anyway, Research and development in buffalo has not been stopped. The Symposium of Americas and Europe, programmed for August in Canada, was postponed of course, but a WhatsApp group was founded to maintain link and information about. The Asian Buffalo Congress will be held, hopefully, in Nepal on June 2021, according the program presented by Prof. Bhuminand Devkota. The World Buffalo Congress will be held on October 2022 in Wuhan, China, according the China Authorities' program report.

The IBF Training course in Italy could not be performed this year, but the Italian Buffalo Breeders Association was active, as reported in this number.

Interesting notes are reported about albinism in buffalo by Bulgaria and China scientists and research activity at Leibniz-Institute for Farm Animal Biology (Germany) and Instituto de Ciencia Animal (CUBA).

Last but not least, a special Research Topic of Frontiers in Veterinary Science, dedicated to buffalo health and production, was published this year including 27 scientific contributions from all over the world.

The IBF Secretariat worked to maintain connections and support to associates. Other requests to become members were examined, reaching 108 IBF associates, representing 37 countries. The list is enclosed, as usual, at the end of this Newsletter. Unfortunately, two people, IBF members, great breeders and buffalo lovers, passed away: Hector Antonio Scannone from Venezuela, and Carlos Maria de Llano from Argentina. We wanted to unknowledge their contribution to buffalo development in this number.

*The Editorial Committee*

**Buffalo Newsletter - Number 36 – December 2020**

Editor: **Antonio Borghese**  
[antonio.borghese@escorena.net](mailto:antonio.borghese@escorena.net)

**Editorial Committee**

Luca Buttazzoni, Vittoria L. Barile, Antonella Chiariotti  
CREA, via Salaria 31, 00015 Monterotondo (Roma) – Italy

**IBF Secretariat**

Antonio Borghese, Vittoria L. Barile, Antonella Chiariotti, Giuseppina M. Terzano,  
Carlo Boselli, Federico Infascelli, Anna Chiacchierini

Network Co-ordination Centre, to which correspondence is to be sent:

[internationalbuffalofed@gmail.com](mailto:internationalbuffalofed@gmail.com)  
IBF, via Salaria 31, 00015 Monterotondo (Roma) – Italy

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitations of its frontiers or boundaries.

This publication contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of the Food and Agriculture Organization of the United Nations.

# REPORTS

## UNCOMMON PHENOMENON IN BUFFALO

**Prof Dr Tzonka Peeva**



President of Bulgarian National Association for  
Development of Buffalo breeding  
Bulgaria

### WHITE CALF FROM A WHITE BUFFALO COW

In the beginning of October 2020 on the farm in Veselinovo village, Bulgaria an albino buffalo cow calved an albino offspring. If this albino buffalo had given birth to a normally pigmented (black) calf, we would not have been so impressed, because 99.99% of albino buffaloes calve black newborns.

But this case is a real phenomenon! An albino buffalo gave birth to an albino calf. Both the buffalo and the newborn (a normally developed female) will be kept under surveillance by the researchers working on the issues of breeding and genetics in the buffaloes in Bulgaria.

### A CASE OF ASYNCHRONOUS TWINS IN A BUFFALO HEIFER

An interesting and very rare phenomenon was observed on the farm of Agricultural Institute – Shumen, Bulgaria. A female buffalo aged 1090 days was observed to give birth to a second newborn (male) after she had calved 49 days earlier (female). Both offspring are normally developed. This phenomenon is highly associated with her melatonin treatment within a trial for induction of puberty, progesterone showing dramatic increase 50 days before the first mating. Field observations have shown that pregnant buffaloes happen to demonstrate signs of estrus and admit being mated by the bull. Actually, in this case none of the matings of the dam was visually witnessed to prove ovulation within an existing gestation. Nevertheless, this phenomenon is qualified as superfetation, ruling out the other possible phenomena, namely embryonic diapause (as highly unlikely to occur in any livestock species), and differentiated development of twin fetuses (as associated with fetal malformation, which was not observed in this case).



**ALBINO MOTHER AND CALF IN BULGARIA**

## REPORT ON BUFFALO COAT COLOR



Yi ZHANG

Assoc Prof

Department of Animal Genetics, Breeding and Reproduction

China Agricultural University, Beijing,

China

White coat phenotype is a common variant in swamp buffalo from China and Southeast Asian. Most recently, by using new genomic approaches, my team uncovered the molecular mechanism and evolutionary history of the white color phenotype in water buffalo.

The paper has been published online in *Molecular Biology and Evolution* titled “*Genomic analysis revealed a convergent evolution of LINE-1 in coat color bubalis*” (<https://doi.org/10.1093/molbev/msaa279>)

ANIMAL GENETICS

Immunogenetics, Molecular Genetics  
and Functional Genomics



REVIEW ARTICLE

doi: 10.1111/age.12911

### Asian water buffalo: domestication, history and genetics

Y. Zhang\* , L. Colli† and J. S. F. Barker‡

\*National Engineering Laboratory for Animal Breeding, Key Laboratory of Animal Genetics and Breeding and Reproduction of MOA, College of Animal Science and Technology, China Agricultural University, Beijing 100193, China. †Dipartimento di Scienze Animali, della Nutrizione e degli Alimenti, BioDNA Centro di Ricerca sulla Biodiversità e sul DNA Antico, Università Cattolica del Sacro Cuore, Piacenza 29122, Italy.

‡School of Environmental and Rural Science, University of New England, Armidale, NSW 2351, Australia.

#### Summary

The domestic Asian water buffalo (*Bubalus bubalis*) is found on all five continents, with a global population of some 202 million. The livelihoods of more people depend on this species than on any other domestic animal. The two distinct types (river and swamp) descended from different wild Asian water buffalo (*Bubalus arnee*) populations that diverged some 900 kyr BP and then evolved in separate geographical regions. After domestication in the western region of the Indian subcontinent (ca. 6300 years BP), the river buffalo spread west as far as Egypt, the Balkans and Italy. Conversely, after domestication in the China/Indochina border region ca. 3000–7000 years BP, swamp buffaloes dispersed through south-east Asia and China as far as the Yangtze River valley. Molecular and morphological evidence indicates that swamp buffalo populations have strong geographic genetic differentiation and a lack of gene flow, but strong phenotypic uniformity. In contrast, river buffalo populations show a weaker phylogeographic structure, but higher phenotypic diversity (i.e. many breeds). The recent availability of a high-quality reference genome and of a medium-density marker panel for genotyping has triggered a number of genome-wide investigations on diversity, evolutionary history, production traits and functional elements. The growing molecular knowledge combined with breeding programmes should pave the way to improvements in production, environmental adaptation and disease resistance in water buffalo populations worldwide.

**Keywords** *Bubalus arnee*, *Bubalus bubalis*, genetic diversity, genomics, river buffalo, swamp buffalo

My team has been working on buffalo genetics for over ten years. In addition to the white buffalo paper, this year, by collaborating with Prof. Stuart Barker (Australia) and Dr. Licia Colli (Italy), we published in *Animal Genetics* a review paper on buffalo genetics (<https://onlinelibrary.wiley.com/doi/10.1111/age.12911>). We published also: *A case study in water buffaloes* (*Bubalus bubalis*) that deliver the updated knowledge of buffalo genetics to the buffalo community as well as the public.

## Genomic Analysis Revealed a Convergent Evolution of LINE-1 in Coat Color: A Case Study in Water Buffaloes (*Bubalus bubalis*)

Dong Liang,<sup>1,1</sup> Pengju Zhao,<sup>1,1</sup> Jingfang Si,<sup>1</sup> Lingzhao Fang,<sup>2</sup> Erola Pairo-Castineira,<sup>2</sup> Xiaoxiang Hu,<sup>3</sup> Qing Xu,<sup>4</sup> Yali Hou,<sup>5</sup> Yu Gong,<sup>6</sup> Zhengwen Liang,<sup>7</sup> Bing Tian,<sup>8</sup> Huaming Mao,<sup>9</sup> Marnoch Yindee,<sup>10</sup> Md Omar Faruque,<sup>11</sup> Siton Kongvongxay,<sup>12</sup> Souksamlane Khamphoumee,<sup>12</sup> George E. Liu,<sup>13</sup> Dong-Dong Wu,<sup>14</sup> James Stuart F. Barker,<sup>15</sup> Jianlin Han,<sup>\*,16,17</sup> and Yi Zhang<sup>\*1</sup>

<sup>1</sup>National Engineering Laboratory for Animal Breeding, Key Laboratory of Animal Genetics and Breeding and Reproduction of MOAR, College of Animal Science and Technology, China Agricultural University, Beijing, China

<sup>2</sup>Medical Research Council Human Genetics Unit at the Medical Research Council Institute of Genetics and Molecular Medicine, University of Edinburgh, Edinburgh, United Kingdom

<sup>3</sup>State Key Laboratory of AgroBiotechnology, College of Biological Sciences, China Agricultural University, Beijing, China

<sup>4</sup>College of Life Sciences and Bioengineering, Beijing Jiaotong University, Beijing, China

<sup>5</sup>Beijing Institute of Genomics, Chinese Academy of Sciences, Beijing, China

<sup>6</sup>Guizhou Domestic Animal Genetic Resources Management Station, Guiyang, China

<sup>7</sup>Agriculture and Rural Affairs Bureau of Fenggang County, Zunyi, China

<sup>8</sup>Animal Disease Prevention and Control Station of Zunyi City, Zunyi, China

<sup>9</sup>College of Animal Science and Technology, Yunnan Agricultural University, Kunming, China

<sup>10</sup>Akkhararatchakumari Veterinary College (AVC), Walailak University, Nakorn Si Thammarat, Thailand

<sup>11</sup>Department of Animal Breeding and Genetics, Bangladesh Agricultural University, Mymensingh, Bangladesh

<sup>12</sup>Livestock Research Center, National Agriculture and Forestry Research Institute, Ministry of Agriculture and Forestry, Vientiane, Lao PDR

<sup>13</sup>Animal Genomics and Improvement Laboratory, Henry A. Wallace Beltsville Agricultural Research Center, Agricultural Research Service, USDA, Beltsville, MD

<sup>14</sup>Kunming Institute of Zoology, Chinese Academy of Sciences, Kunming, China

<sup>15</sup>School of Environmental and Rural Science, University of New England, Armidale, NSW, Australia

<sup>16</sup>International Livestock Research Institute (ILRI), Nairobi, Kenya

<sup>17</sup>CAAS-ILRI Joint Laboratory on Livestock and Forage Genetic Resources, Institute of Animal Science, Chinese Academy of Agricultural Sciences (CAAS), Beijing, China

<sup>†</sup>These authors contributed equally to this work.

\*Corresponding authors: E-mails: yizhang@cau.edu.cn; h.jianlin@cgjar.org.

Associate editor: Melissa Wilson

### Abstract

Visible pigmentation phenotypes can be used to explore the regulation of gene expression and the evolution of coat color patterns in animals. Here, we performed whole-genome and RNA sequencing and applied genome-wide association study, comparative population genomics and biological experiments to show that the 2,809-bp-long LINE-1 insertion in the *ASIP* (agouti signaling protein) gene is the causative mutation for the white coat phenotype in swamp buffalo (*Bubalus bubalis*). This LINE-1 insertion (3' truncated and containing only 5' UTR) functions as a strong proximal promoter that leads to a 10-fold increase in the transcription of *ASIP* in white buffalo skin. The 165 bp of 5' UTR transcribed from the LINE-1 is spliced into the first coding exon of *ASIP*, resulting in a chimeric transcript. The increased expression of *ASIP* prevents melanocyte maturation, leading to the absence of pigment in white buffalo skin and hairs. Phylogenetic analyses indicate that the white buffalo-specific *ASIP* allele originated from a recent genetic transposition event in swamp buffalo. Interestingly, as a similar LINE-1 insertion has been identified in the cattle *ASIP* gene, we discuss the convergent mechanism of coat color evolution in the Bovini tribe.

**Key words:** white coat color, water buffalo, *ASIP* gene, LINE-1, transposon, convergent evolution.

## GENOME RESEARCH ON BUFFALO IN GERMANY



Andreas Hoeflich<sup>1\*</sup>, Antonia Noce<sup>1</sup>, Julia Brenmoehl<sup>1</sup>, Klaus Wimmers<sup>1</sup>, and Manfred Thiele<sup>2\*</sup>

<sup>1</sup>Leibniz-Institute for Farm Animal Biology (FBN), Wilhelm Stahl Allee 2, 18196 Dummerstorf, Germany

<sup>2</sup>German Buffalo Association, Chursdorfer Straße 42, 09322 Penig, Germany.

\*Correspondence to [hoeflich@fbn-dummerstorf.de](mailto:hoeflich@fbn-dummerstorf.de) and [bueffelverband@gmx.de](mailto:bueffelverband@gmx.de)

(paper #accepted (610353) for publication in *Frontiers in Genetics*)

Buffalo economy seems to attract more and more breeders in Germany, and the heads are constitutively increasing during the last 20 years (Fig.1). In 2020, 7614 animals were registered with a distribution over all parts of the country. However, the German buffalo population is comparably diverse since the animals were imported from Italy, Romania, and Bulgaria based on private initiatives. The genetic biodiversity of German buffalo populations offers great opportunities for genetic breeding progress, but the lack of coordinated breeding programs hinders the development of a sustainable buffalo economy in Germany by using the existing genetic potential.

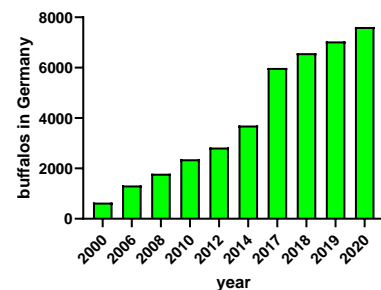


Fig.1: Constitutive increase of the German buffalo population during the last 20 years (source: GBA)

In order to develop a procedural method in our hands for a broader genetic analysis of buffalo in Germany and Europe in the future, the German Buffalo Association (GBA) and the Institute of Genome Biology from the Leibniz Institute for Farm Animal Biology (FBN) in Dummerstorf have initiated a pilot study in 2018. For this pilot study, herds in Germany (N=4), Romania (N=2), Bulgaria (N=2), and Hungary (N=3) were selected, and tissue samples (N=646) were collected by Manfred Thiele (GBA President) and Andreas Hoeflich (FBN) during or after personal visits to several farms.

After the extraction from ear tag biopsies, genomic DNA was hybridized with the Axiom™ Buffalo Genotyping Array from Thermo Fisher. Antonia Noce performed an autosomal genetic diversity analysis to obtain a comprehensive overview of the genetic distance by including genotype information of other globally distributed buffalo populations (India, Pakistan, Mozambique, Egypt, Turkey, Iran, Brazil, Colombia, and Italy) previously published (Colli et al. 2018, Deng et al. 2019). She next carried out a

genetic structure analysis to determine the gene pool characteristic of each population and reconstruct their historical relationship (ancestry). Finally, she performed Run of Homozygosity (ROH) analysis in our dataset to infer the level of inbreeding and to evaluate whether it is an ancient or recent inbreeding event.

The study was financed from the FBN Dummerstorf and currently is under review for publication.

### **Acknowledgments:**

The authors want to express their gratitude for the immense support experienced during sample collection, and it is impossible to list the names of all helpers and supporters here. In addition, we are also grateful for the qualification received during the “4th IBF Training Course on Buffalo Management and Industry” by Prof. Borghese and his wonderful team in Monterotondo, Italy.



**ANDREAS HOEFELICH, ANTONIA NOCE, ANTONIO BORGHESE AND JULIA BRENMÖHL DURING THE IBF TRAINING COURSE 2019**



## WATER BUFFALO IN THE UNITED KINGDOM



Claire Llewellyn  
Oakley Manor Farm  
Lichfield, Staffordshire.  
UK  
[www.mattwellyn.co.uk](http://www.mattwellyn.co.uk)

In the UK water buffalo are very underutilized. There are estimated to be less than five thousand buffaloes, but they are beginning to become more popular, largely thanks to a television program which featured a buffalo farm in Scotland.

It is unfortunate that a lack of knowledge transfers into a negative feeling within the general population of the UK with domestic buffalos often being mistaken for Bison or African Buffalos and therefore usually perceived to be dangerous.

On our small farm in the Midlands, we are working hard to portray buffalo in a more positive light as the kind, gentle animals they really are. We currently have a herd of just over fifty buffalos mainly based on Italian genetics. We are only presently milking ten but hope to double our numbers next year. The buffalos are milked once a day and returned to their calves overnight which is referred to as 'ethical



milking' in the UK and gives the future generation the best start as well as providing us with plenty of good quality milk.

The raw milk will be sold from a vending machine at the farm gate for the general public to purchase. There is only one other farm in the UK currently selling milk via this method and we hope to work closely with them to further promote the buffalo. The male calves are castrated at birth and sold as meat boxes directly from the farm when they reach the appropriate size. Some of our males have recently been sold to join a scheme for conservation and land management, we believe that buffalos could be very useful in this way.

There have been many challenges to UK agriculture in recent years and farmers face a lot of negativity. We are attempting to combat this by helping to educate the public in our high levels of welfare and the attention the animals receive throughout their lives. By working closely with the IBF, we hope develop a stud book and Association in the UK but we need other Buffalo farmers to come on board, something we will work hard to achieve.

Let's hope 2021 is a much better year for the entire world, I'd like to wish you all seasons greetings and a happy healthy 2021.



Oakley Manor Farm (UK)

## THE BRAZILIAN ASSOCIATION OF BUFFALO'S BREEDERS CELEBRATES ITS 60 YEARS.



Caio Rossato

President of the Brazilian Buffalo Breeders Association

ABCB

Founded in 1960, The Brazilian Association of Buffalo's Breeders is now completing 60 years old. A big celebration was going to occur in São Paulo, with the presence of lot of foreigner delegations. In addition, many technical lectures and tributes to the ex-presidents were planned. The event was canceled in order to respect the governmental instructions about the pandemic of Corona virus.



BOARDS OF DIRECTORS OF ABCB



**ABCB MEETING WITH BRASILIAN  
MINISTER OF AGRICULTURE TEREZA  
CRISTINA DIAS**

Nowadays, Brazil has 2 million buffalos, that are raised around the 26 Brazilian states and the main focus is on meat and milk. During the past years, the industry of buffalo's milk has grown significantly, not only industrially but also in terms of consumption. The buffalo's meat sector developed different cuts and packaging systems, improving also the young calves production method. In genetics, Brazil dominates the embryo transfer technique and, through its researchers, has made a big effort on improving the breeds raised in the country.

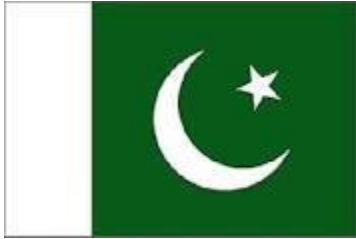
The Exchange of information with American countries has grown a lot with the new technological resources in communication, in a way that now it is possible to talk about an effective integration between the breeder's countries in the continent. The Association live activities are limited by sanitary orders due to COVID-19, but some other online activities are being organized (lives, video conferences). The

buffalo breeders from Brazil are expecting the end of this enormous pandemic to return to the traditional activities, such as fairs, events and courses.



**BRASILIAN DELEGATION OF ABCB AT THE IBF TRAINING COURSE IN ITALY (2019)**

## REPORT ON PAKISTAN INTERNATIONAL BUFFALO CONGRESS (IBC)-2019



**Muhammad Avais**

Department of Veterinary Medicine

Faculty of Veterinary Science

University of Veterinary and Animal Sciences, Lahore-Pakistan

Based upon the economic significance of livestock sector and particularly buffalo, and potential future export market of either live animals or their products, the Government of the Punjab organized the 'International Buffalo Congress' and 'National Livestock and Buffalo Show' 2019. The University of Veterinary and Animals Sciences, Lahore and Livestock and Dairy Development Department, Punjab implemented this. The objectives of the event were to review, update, share and disseminate the latest research-based knowledge on thematic areas of buffalo, and to showcase Pakistani buffalo's in terms of milk and meat production.

The Rome-based Secretary of the International Buffalo Federation, and the President of the Asian Buffalo Association attended the congress. More than 60 international experts from 17 different countries took part in this congress, including India, China, Iran, Sri Lanka, Nepal, Iraq, Thailand, Philippines, Bulgaria, Italy as well as Canada and the USA. About 500 national delegates from all over the country attended the event. The Congress was inaugurated by the CM Punjab whereas the Chancellor and Governor Punjab graced the occasion on the concluding ceremony. Minister Livestock Punjab, Sardar Hasnain Bahadar Dreshak remained deeply involved throughout and played a key role in making this event a great success. The way forward for us is that we continue to provide support to this sector, resolve issues which are limiting our exports and encourage holding of the next World Buffalo Congress scheduled for 2022.

The congress organizers have prepared a comprehensive report highlighting the various activities of the event, and on behalf of the Vice Chancellor UVAS Prof. Dr. Nasim Ahmad, I am pleased to share this report (video-link & pdf file) for your kind appraisal. I hope you will appreciate our humble efforts and support us in future events to make it a success.



# IB©2019 Report



<https://online.fliphtml5.com/elcbx/zrry/>

## CURRENT SITUATION OF BUFFALO IN CUBA

### RESEARCH RESULTS FROM THE INSTITUTO DE CIENCIA ANIMAL (ICA)



José Raúl López Álvarez<sup>1\*</sup>, Mélni Domínguez<sup>2</sup>, Yenny García<sup>3</sup>, Luis Mateo Fraga<sup>4</sup>

1. \*Associate of the Cuban Academy of Sciences, **Member of the International Buffalo Federation**. Assistant Researcher, Instituto de Ciencia Animal. Central highway km 47 and a half, San José de las Lajas, Mayabeque, Cuba. [jrlopez@ica.co.cu](mailto:jrlopez@ica.co.cu), [jrlavarez@gmail.com](mailto:jrlavarez@gmail.com)
2. Scientific Reserve, Instituto de Ciencia Animal.
3. Associate Researcher, Instituto de Ciencia Animal.
4. Senior Researcher, Instituto de Ciencia Animal.

In Cuba, buffalo milk and meat productions are obtained from herds of the Buffalypso breed and their mestizos, located in dairy farms and distributed in all provinces.

Since the introduction of the species in the country in 1983, it has experienced accelerated growth, up to the last five years when the growth has been modest. At the end of 2019, the National Office of Statistics and Information (ONEI) reported that the buffalo population in Cuba is 59.3 thousand head, with 92.3% of the national population in the state and business sector. The production was 5.7 million liters from 5.6 thousand milking buffalo cows with an average yield of 2.5 liters. The meat production in the country is not reported, because it is considered as by-products of the dairy production system.

The buffalo industry in general presents limitations in terms of productivity and mass growth. National Policies, facing this situation, have been implemented to enhance business production systems and increase private-peasant participation in the Cuban bubalinoculture. In Cuba, these systems in many cases have emerged as a viable option for livestock production and contributed to the recovery of state companies due to their limited income from raising cattle.

Within the institutional strengthening actions in buffalo scientific development in CUBA, a memorandum of understanding was signed between the ICA and the CREA Research Center for Animal Production and Aquaculture of Italy, and with the International Buffalo Federation by having an IBF member from Cuba (2016 - to date), in addition to the participation of colleagues Dr. Vittoria Lucia Barile and Dr. Antonella Chiariotti (CREA-IBF), in events and courses developed by the ICA in Cuba.

### **Results in artificial calf rearing system (preliminary)**

There is little experience in Cuba on artificial rearing of calves. For this reason, two trials were developed to evaluate the use of milk substitutes.

In the first evaluation, the artificial rearing was developed with buckets and teats, and the calves were kept in individual cages. The calf was present during milking to stimulate the descent of the milk but did not suck from the mother. The calves received 640 grams of substitute per day, divided into one liter at each feeding.



**BUFFALO CALVES IN ARTIFICIAL REARING, WITH BUCKETS IN INDIVIDUAL CAGES. (PHOTO BY JOSÉ RAÚL LÓPEZ ÁLVAREZ)**

The main results showed an adaptation period of seven days (on average), and the oldest calves (12-15-day calves) adapted better to the rearing system. After 45 days, the feed consumption was approximately 800 g. It was estimated that when they reached 90 days, the calves consumed more than 1.2 kg. per day.

The maximum live weight was gained during the first month of life.



In the second trial the calves could suck from the mother to stimulate the descent of the milk and then they were fed in bowls. The result was different, the adaptation period was longer (17 days on average), given the strong maternal instinct of the calves and the resistance they offer to be fed artificially. The older calves (13 and 25 days) adapted better to the rearing system than those that started the test at the age of 10 days.

Furthermore, the intake of milk replacer was not stable and was less than two liters per day. The cause of this instability in consumption was apparently associated with the type of management. On the other hand, feed consumption increased above 500 grams after the sixth week.

The productive performance of the calves in the first treatment with milk substitutes was inferior to that of the second treatment.

In general, the results showed that the use of the artificial rearing system allowed an increase in milk yield without affecting the productive behavior of the calves. The milk could be commercialized or used in the cheese processing to obtain a product with higher added value. The value of the cheese commercialization could favor investment in food of higher quality in artificial rearing systems of buffalo calves in Cuba and improvements in the Cuban buffalo production chain.



**BUFFALO CALVES IN ARTIFICIAL REARING WITH THE SUPPORT OF THE CALF FOR MILKING THE MOTHER AND FED IN BOWLS.  
(PHOTO BY JOSÉ RAÚL LÓPEZ ÁLVAREZ)**

The strong maternal instinct of calves to suckle from the mother is demonstrated, so the use of teats or bottles is essential in these rearing systems.

## **Results in meat production systems**

In recent years, studies were carried out at the Institute of Animal Science in extensive production systems for meat production. The results show a high growth rate of calves at slaughtering (240 days of age) with weight daily gain higher than 900 grams (g) and weight over 250 kg, with carcass yields higher than 50%. This result suggests a high level of productive efficiency in the meat production system with low inputs and indicates the importance of looking for alternative food in post-weaning stages that allow similar gains and slaughter animals weighing more than 400 kg at 14 months old.

## **Main results achieved in buffalo genetics in Cuba**

The integral characterization has been carried out with genetic, productive and reproductive studies in different genetic companies in the Country. Specifically, in the Genetic Livestock Company "El Cangre", Mayabeque, which is the milestone of buffalo development in Cuba.

In the history of milk production, the first studies of the average and individual lactation curves were carried out using multiphasic functions, application of the impact measurement methodology on productive and reproductive indicators, the genetic parameters of the characteristics of the lactation curve and the morphometric characteristics that characterize dairy females, which made it possible to lay the foundations of the selection of a biotype that allows the sustainable breeding of this species under Cuban conditions. The type of inheritance of the albinoid coloration and its frequency were determined as well, creating the base of the study of the advantages or disadvantages of this coloration in our environment. The best unbiased linear predictors were obtained in each indicator evaluated for selection.

The genetic parameters of the traits of dairy productive behavior have been estimated: cumulative milk production at 244 days of lactation (PL244), duration of lactation (DLAC) and persistence of lactation (P2: 1), in buffalo females belonging to the Genetic Livestock Companies "El Cangre", "Los Naranjos" and "Matanzas", which are part of the Genetic Improvement Program for buffalo in Cuba. The data were taken from crossbred buffaloes (Buffalypso x Carabao). For the estimation of the variance components, the restricted maximum likelihood method (REML) was used, through an animal model, in multi-trait analysis. The estimation of heritability for PL244, DLAC and P2: 1 was  $0.17 \pm 0.06$ ,  $0.13 \pm 0.08$ , and  $0.21 \pm 0.04$ , respectively. The genetic correlation between PL244 and DLAC was  $0.63 \pm 0.03$ , between

P2: 1 with PL244 and DLAC was  $0.38 \pm 0.04$  and  $0.50 \pm 0.06$ , respectively. The estimated heritability for PL244 and P2: 1, allowed us to consider that it is possible to obtain genetic gains, when selecting directly for these traits. The estimated genetic correlations suggest that the selection for PL244 would lead to an increase in DLAC, as well as that with the increase of the latter, positive changes in P2: 1 are achieved.

Likewise, the genetic parameters for milk production on the control day (PDC) and cumulative milk production at 240 days of lactation (PL240) of crossbred buffaloes (Buffalypso x Carabao) were estimated. A model was used that included the fixed effects: contemporary group (herd-year and control day) and the number of lactations; random effects: genetic additive, permanent and residual environment. The estimated heritability for PDC ranged from 0.09 to 0.21 and the highest value was found in the third month of control. The genetic correlations between PDC and PL240 were high and positive with values ranging from 0.80 to 0.98. It is concluded that the highest heritability estimate for PDC was found in the third month of control. The genetic correlation between this and PL240 had a value of 0.

In the case of the evaluation of the males, different growth models were used, the adjusted coefficient of determination that was calculated between the values predicted by each model and the observed values was higher in the Von Bertalanffy and Gompertz models, occurring in a similar way, with the mean squares of the error being other adjustment indicators similar, which proves that these two models presented the best adjustments. In this way, the individual genetic values (best unbiased linear predictor) would have an individual fit to the general growth curve that could be included in the selection index as an indicator of the growth of each animal.

Selection indices were made using the principal component analysis methodology. In general, the correlations between the weights at the beginning, 12, 15, end, gain and weight for age are high, but their consideration of all in the index could help to increase the precision of the evaluation. This procedure could be considered as an alternative in the selection of buffalo in behavioral tests, and the possibility of incorporating the information of descendants and parents into an index should be studied in order to make an evaluation of future sires in behavioral tests. We worked on the methodology to determine the relative economic values (SEE) from the Production Value (Income) and from the Benefits per animal and year.

In the future buffalo in Cuba should play a very important role as a multipurpose animal in rural systems.



VISIT TO EL CANGRE FARM (CUBA 2019)



## ANASB (Italian Buffalo Breeders Association) SELECTION ACTIVITIES



ANASB – R&D office

Caserta, Italy.

<http://www.anasb.it/>



**PRESIDENT OF ANASB NICOLA PALMIERI AND GENERAL SECRETARY OF IBF ANTONIO BORGHESE**

National Association of the Buffalo Species (ANASB), was established in 1979 and recognized in 1994 by the Ministry of Agriculture and Forestry. The Ministerial Decree 20154 of 11 February 2000 entrusts ANASB with the Herd Book of the Buffalo Species, previously managed by the Italian Breeders Association (AIA). In the same year, the D.M. 201992 of 5 July 2000 recognizes that the buffaloes registered in the Herd Book belong to their own breed, defined as the Italian Mediterranean buffalo. ANASB is a non-profit organization and carries out its activity in the national territory and abroad as a Selection Institution within the framework of European and National legislation on the discipline relating to zootechnical and genealogical conditions applicable to animal reproduction. In line with the objectives established by the European Agricultural Policy in the sectors of reproduction, reconstitution and conservation of zootechnical biodiversity, it implements programs and activities in a homogeneous way on the national territory, guaranteeing the participation of breeders operating in the sector and the correct management and development of the genetic heritage of the Italian Mediterranean buffalo breed. The reform of the animal reproduction sector, in force in Italy since May 2018, represented a

fundamental opportunity to modernize the structure and focus on the continuous improvement of ANASB activities, subjecting them to the attention and approval of the members. The transformation of the association in the first instance, generating a direct relationship with buffalo breeders, has highlighted an indispensable precondition to enhance an efficient genetic improvement in the buffalo sector, with participation and involvement of breeders, that can express and report their critical and



positive issues. Furthermore, the new ANASB organization aimed to improve the quality of work, focusing on the increase of Breed Experts staff, who act as a daily link with the breeders and their employees, and on the professional growth and qualification of the Research & Development study office.

The changing times, which have led to increasingly fierce commercial competition and general costs, have prompted buffalo farmers to look for best methods to improve farming efficiency, specially by genetic improvement tools.

Genetic improvement is a dynamic process that must evolve over time by supporting and responding to the needs of breeders, the market and the territorial context in which they operate. The effectiveness of a breeding program is mainly based on the ability of selective tools (genetic indices) to correctly

identify the improving animals. It is also good to remember that all animal productions are linked to each other (favorably or not) from a genetic point of view and using this combined information can provide more accurate and more stable estimates.

The introduction of the new aggregate Selection Index for the Italian Mediterranean Buffalo (IBMI) represented an important turning point within the selective activity of ANASB. The continuous comparison with both farmers and processors has shown that a further step was necessary in order to emphasize even more the dairy attitude of the subjects of Italian Mediterranean buffalo, while at the same time enhancing their production levels (ie, kg of milk) and functional morphology. In particular, this last aspect has always been at the heart of the farmers' requests, to obtain productive animals with morphological characteristics that favor their longevity.

Based on these considerations, the ANASB technical office, in collaboration with the Institute of Agricultural Biology and Biotechnology of the CNR of Milan and with the Department of Veterinary Medicine and Animal Production of the Federico II University of Naples, has developed the updated IBMI selection index, approved from December 2018.

The selective tool used previously, the PKM index, was limited to aiming at the production in terms of mozzarella kg produced in a single lactation, correlating the quantity of milk with the percentages of fat and proteins, but without taking into account the morphological characters, or the ability of a reproducer to improve the qualitative characteristics of milk.

In the long term, selective criteria for PKM index has led to a marked increase in production, but not harmonized and with negative trends for the percentages of fat and protein, yield and morphology (in particular of the feet).

Thanks to new IBMI index different characteristics are taken into account, such as limbs and feet, mammary system, kg of milk and percentages of fat and proteins, to which a weight of 24, 20, 21, 15 and 20 % respectively has been attributed. It should not be underestimated that the aspects on which the new index is working lead to other extremely positive ones, such as longevity (therefore a lower replacement of heifers to breed, with a consequent positive impact both on management costs and on the environment in terms of nitrogen produced) and better fertility, another fundamental element for farm economy.

From 2017 to date, ANASB activities showed a very positive trend, as summarized in the following table.

### ANASB ACTIVITIES IN THE LAST THREE YEARS

	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b> (30/10/20)	<b>Increase (n) 2017 - 2020</b>	<b>Increase (%) 2017 - 2020</b>
<b>Associated breeders</b>	265	294	396	750	<b>+ 485</b>	<b>+ 183,0</b>
<b>Animals in database</b>	858'882	928'511	989'303	1'059'691	<b>+ 200'809</b>	<b>+ 23,4</b>
<b>Complete lactations</b>	835'855	882'492	917'680	975'778	<b>+ 139'923</b>	<b>+ 16,7</b>
<b>Buffaloes in production</b>	46'654	50'547	50'842	43'907	<b>- 2'747</b>	<b>- 5,9</b>
<b>270 Days of lactation (lt)</b>	2'359	2'357	2'356	Current year (data not yet available)	-	-
<b>% fat (mean values)</b>	7.98	8.03	8.01	Current year (data not yet available)	-	-
<b>% Protein (mean values)</b>	4.63	4.63	4.63	Current year (data not yet available)	-	-
<b>DNA tests deposited</b>	46'902	49'961	53'828	57'120	<b>+ 10'218</b>	<b>+ 21,8</b>
<b>Proven bulls</b>	33	36	69	73	<b>+ 40</b>	<b>+ 121,2</b>
<b>Evaluated farms</b>	3'821	3'908	4'219	4'429	<b>+ 608</b>	<b>+ 15,9</b>
<b>Evaluated animals</b>	83'078	85'739	95'748	102'747	<b>+ 19'669</b>	<b>+ 23,7</b>

Indeed, in the last three years the number of members and DNA tests was doubled and tripled respectively and, in March 2020, the ANASB database exceeded the record threshold of over 1 million registered animals.



The network of relationships with Universities and National Research Centers (CNR) represents a pillar of ANASB activity. In recent years, ANASB has strongly consolidated the collaboration relationship with the Department of Veterinary Medicine and Animal Production of the Federico II University of Naples, also opening new collaborations with the CNR - IBBA of Milan and with other Universities, such as Sassari, Padova and, more recently, Bari University. Currently, ANASB is projected towards new frontiers, with particular reference to genomics, precision farming systems in farms and the sustainability of the entire buffalo sector.

More recently, in order to constantly optimize the currently available tools for selection (genetic indices), ANASB has introduced the use of "genetic groups" method in the model of genetic evaluation of subjects. This approach, already used for cattle, made it possible to manage the lack of genealogical data for checked population of Italian Mediterranean buffaloes, a recurring problem due to the limited use of instrumental insemination, in turn caused by the physiological characteristics of the species (negative photoperiod, difficulty in detection of estrous, etc.), with consequent wide use of natural mating. Thanks to genetic group procedure, it was possible to assign a more accurate genetic index for greater number of subjects, improving the estimate of the animal's genetic value and speeding up the selective pressure that is transferred to the progeny.

In conclusion, ANASB undoubtedly represents a point of reference in the field of modern buffalo genetic improvement and consequently an Italian excellence also, in particular in the south, where the territory was the selection cradle of Italian Mediterranean buffalo. By virtue of the large amount of data available and supported by more accurate genetic estimates, ANASB can act with certainty in the field of genetic improvement, to enhance the peculiar characteristics of this rustic, resistant and generous breed. Buffalo milk obtained appear unique for its characteristics and is intended for the production of an equally special product, the buffalo mozzarella cheese, thanks to which the buffalo sector is now a leader in the world.



TRAINING COURSE FOR BREED EXPERTS



## RESEARCH TOPIC BUFFALO HEALTH AND PRODUCTION IN FRONTIERS IN VETERINARY SCIENCE

Edrs. Antonio Minervino, Domenico Vecchio, André Mendes Jorge, and Selwyn Headley

Dear IBF delegates,

From late 2019 and during the entire year, I and the researchers Domenico Vecchio (Italy), André Mendes Jorge (Brazil), and Selwyn Headley (Brazil) edited a special issue dedicated to all aspects of buffalo science. The Research Topic Buffalo Health and Production (<https://www.frontiersin.org/research-topics/11723/buffalo-health-and-production>) was published by the open-access journal Frontiers in Veterinary Science (<https://www.frontiersin.org/journals/veterinary-science>), Pubmed-indexed and with an impact factor of 2.245, ranking in 19/141 (Q1) in the Veterinary Sciences category from Web of Science. The publisher, Frontiers, ranks as the 5th most-cited publisher among the 20 largest publishers in 2020. Since it is an open-access journal, all papers will be freely available for download to everyone, permanently.

This Research Topic about buffalo had a great level of quality, with a total of 36 manuscripts submitted and 27 accepted and 7 rejected, while 2 are still under review. showing the quality of the work produced by buffalo researchers. So far, the Research Topic has 292 authors from many countries. The research topic has already more than 30 thousand views so far with almost 3 thousand articles download. The top 5 countries that most viewed the published papers were: USA, China, Brazil, Germany, and Italy.

The published paper ranged from a wide variety of themes, including reproduction, cloning, nutrition and physiology, infectious diseases, metabolic disease, dairy production, and others. I will draw special attention to the paper *Bubalus bubalis: A Short Story* (<https://www.frontiersin.org/articles/10.3389/fvets.2020.570413/full>). A review paper that deals with several aspects of buffalo and provided and updated word population count and counties that have buffalo herd.

One of the reasons that drive me to start this publication was the perception of good quality research about buffalo being published in poor quality journals. Even in predatory journals. When choosing the venue to publish, researchers must always select the ones that will produce rigorous but fair peer-

review and that will allow the discoverability of the research, archived thought indexing in major repositories.

Considering the success of the Research Topic, we will launch a new Special Edition about buffalo, probably in January of 2021, at a different journal with a lower APC (article processing fee) and high impact factor. For this new publication, we secure a special discount for all IBF members. Additionally, we are looking for a co-editor from Asia, the birthplace of buffalo, for this special edition. The requirements for co-editor are a minimum of 20 peer-review for international journals completed (verified at Publons). Editorial activity is preferable but not mandatory. Interested can contact me directly.

I hope that all IBF members enjoy the many papers published in the Research Topic and that you can submit your next paper to the forthcoming special issue about buffalo.

Sincerely,

Antonio Minervino,

IBF Delegate

Associated professor, LARSANA, UFOPA

<https://publons.com/researcher/769295/antonio-humberto-minervino/>

Email: ah.minervino@gmail.com

1. [Identification of Pathogenic Leptospira Species in the Urogenital Tract of Water Buffaloes \(Bubalus bubalis\) From the Amazon River Delta Region, Brazil](#)

Israel Barbosa Guedes , Gisele Oliveira de Souza, Juliana Fernandes de Paula Castro, Antônio Francisco de Souza Filho , Matheus Burilli Cavalini, Sueli Akemi Taniwaki, Anderson Luiz Pinheiro Maia, Isaías Corrêa Pereira and Marcos Bryan Heinemann

**Brief Research Report**

In the current context of deforestation and fire in the Amazon, buffaloes could be a cost-effective and sustainable alternative for cattle production in the region, as they can convert low-quality foods and be raised in floodplain areas. However, ...

Published on 14 May 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00269

2. [Thermoregulatory and Behavioral Responses of Buffaloes With and Without Direct Sun Exposure During Abnormal Environmental Condition in Marajó Island, Pará, Brazil](#)

Leticia Godinho Athaíde , Waleria Cristina Lopes Joset , Jean Caio Figueiredo de Almeida , Messy Hennear de Andrade Pantoja , Rafaella de Paula Pacheco Noronha , Andréia Santana Bezerra , Antônio Vinicius Corrêa Barbosa , Lucieta Guerreiro Martorano , Jamile Andréa Rodrigues da Silva and José de Brito Lourenço Júnior

**Original Research**

This study aimed to assess the effect of thermal-hydraulic variables in female buffaloes with or without direct solar exposure in a year of strong El Niño through behavior responses and infrared thermography to reinforce the environmental comfort ...

Published on 25 November 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.522551

3. [Passive Immunity Transfer in Water Buffaloes \(\*Bubalus bubalis\*\)](#)

Damazio Campos de Souza , Daniela Gomes da Silva, Lana Cristine Coelho Fonseca, Letícia de Castro Fiori, Bruno Moura Monteiro, Otávio Bernardes, Rinaldo Batista Viana and José Jurandir Fagliari

**Original Research**

This study aimed to evaluate passive immunity transfer in healthy buffalo calves. Colostrum samples from heifers (without previous calving) and primiparous and pluriparous dams and blood samples from their offspring were obtained at calving, before ...

Published on 17 June 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00247

4. [Infrared Thermography to Assess Thermoregulatory Reactions of Female Buffaloes in a Humid Tropical Environment](#)

Carolina Carvalho Brcko , Jamile Andréa Rodrigues da Silva , Lucieta Guerreiro Martorano, Reíssa Alves Vilela, Benjamim de Souza Nahúm, André Guimarães Maciele Silva , Antônio Vinicius Corrêa Barbosa, Andréia Santana Bezerra and José de Brito Lourenço Júnior

**Original Research**

This study employed infrared thermography to assess the thermoregulatory responses of female buffaloes reared in a hot and humid climate as a function of variations in time and the thermal environment, and to correlate rectal temperature with that of ...

Published on 19 May 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00180

5. [Generation of Transgenic Cloned Buffalo Embryos Harboring the EGFP Gene in the Y Chromosome Using CRISPR/Cas9-Mediated Targeted Integration](#)

Xiuling Zhao , Junyu Nie, Yuyan Tang, Wengtan He, Kai Xiao, Chunying Pang, Xianwei Liang , Yangqing Lu and Ming Zhang

**Original Research**

Sex control technology is of great significance in the production of domestic animals, especially for rapidly breeding water buffalo (*bubalus bubalis*), which served as a research model in the present study. We have confirmed that a fluorescence ...

Published on 23 April 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00199

6. [Knockdown of CYP19A1 in Buffalo Follicular Granulosa Cells Results in Increased Progesterone Secretion and Promotes Cell Proliferation](#)

Xingrong Lu, Anqin Duan, Xiaoya Ma, Shasha Liang and Tingxian Deng

**Original Research**

Cytochrome P450 aromatase 19A1 (CYP19A1) is a critical enzyme in estrogen synthesis. However, the effect of CYP19A1 on cell growth and hormone secretion of buffalo follicular granulosa cells (BFGCs) is poorly understood. The objective of this study ...

Published on 25 September 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.539496

7. [Selectivity of Leguminous Trees by Water Buffaloes in Semi-intensive Systems](#)

Maykel Andrés Galloso-Hernández , Vicente Rodríguez-Estévez, Carlos Armando Alvarez-Díaz, Mildrey Soca-Perez, Devon Ronald Dublin , Jesús Iglesias-Gómez and Leonel Simon Guelmes

**Original Research**

Water buffaloes (*Bubalus bubalis*) manifest different levels of selectivity for different pastures and forages. Knowledge of feed selectivity is important to facilitate the design of efficient production systems that take into account optimal animal ...

Published on 24 November 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.542338

8. [Early Prediction of Corpus Luteum Functionality Using an Imaging Software](#)

Angela Salzano , Marco Russo , Giuseppe Anglani , Francesca Licitra , Gianluigi Zullo , Alessio Cotticelli , Gerardo Fatone and Giuseppe Campanile

**Original Research**

The present study aimed to assess the applicability of luteal blood flow data acquired through the use of color Doppler ultrasonography and a post-processing analysis tool (ImageJ) for predicting pregnancy in buffaloes (*Bubalus bubalis*). The ...

Published on 18 June 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00299

9. [Effet of Silvopastoral Systems in the Thermoregulatory and Feeding Behaviors of Water Buffaloes Under Different Conditions of Heat Stress](#)

Maykel A. Galloso-Hernández , Vicente Rodríguez-Estévez, Carlos A. Alvarez-Díaz, Mildrey Soca-Pérez, Devon Dublin , Jesús Iglesias-Gómez and Leonel Simon Guelmes

**Original Research**

Buffaloes use wallowing behavior to release excess heat in tropical conditions. The aim of this study was to evaluate the impact of silvopastoral systems in the feeding and thermoregulatory behavior of water buffaloes under moderate and intense heat ...

Published on 17 July 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00393

10. [Inferring Relationship of Blood Metabolic Changes and Average Daily Gain With Feed Conversion Efficiency in Murrah Heifers: Machine Learning Approach](#)

Poonam Sikka , Abhigyan Nath, Shyam Sundar Paul , Jerome Andonissamy , Dwijesh Chandra Mishra , Atmakuri Ramakrishna Rao, Ashok Kumar Balhara , Krishna Kumar Chaturvedi, Keerti Kumar Yadav and Sunesh Balhara

**Original Research**

Machine learning algorithms were employed for predicting the feed conversion efficiency (FCE), using the blood parameters and average daily gain (ADG) as predictor variables in buffalo heifers. It was observed that isotonic regression outperformed ...

Published on 02 September 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00518

11. [Lipid Accumulation and Injury in Primary Calf Hepatocytes Challenged With Different Long-Chain Fatty Acids](#)

Bingbing Zhang , Wei Yang, Shuang Wang, Runqi Liu, Juan J. Loor , Zhihao Dong, Yingying Zhao, Xinru Ma, Cheng Xia and Chuang Xu

**Original Research**

Fatty liver disease is one of the most common disorders afflicting dairy cows during the postpartum period and is associated with increased blood non-esterified fatty acid (NEFA) uptake by the liver.

Major long-chain fatty acids (LCFA) in NEFA are ...

Published on 15 October 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.547047

12. [Comparative Analysis Using Pulsed-Field Gel Electrophoresis Highlights a Potential Transmission of Salmonella Between Asymptomatic Buffaloes and Pigs in a Single Farm](#)

André Marcos Santana , Daniela Gomes da Silva, Renato Pariz Maluta, Lucas José Luduverio Pizauro , Kalina Maria de Medeiros Gomes Simplício, Clarissa Helena Santana, Sarah de Andrade Dias Rodrigues, Dália dos Prazeres Rodrigues and José Jurandir Fagliari

**Brief Research Report**

Buffaloes and pigs play an important epidemiological roll in the Salmonella infection cycle, and asymptomatic animals can act as key component in the dissemination of the disease by horizontal, vertical, and cross-species transmission. Our study ...

Published on 10 November 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.552413

13. [Seasonal Dynamics of Physiological, Oxidative and Metabolic Responses in Non-lactating Nili-Ravi Buffaloes Under Hot and Humid Climate](#)

Mengwei Li , Faiz-ul Hassan , Yanxia Guo, Zhenhua Tang, Xin Liang, Fang Xie, Lijuan Peng and Chengjian Yang

**Original Research**

Hot and humid weather exposes animals to high temperature and relative humidity that ultimately reduce their ability to disperse body heat. To avoid serious consequences of heat stress, it is imperative to understand animal physiological responses ...

Published on 08 September 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00622

14. [Study of Milkability and Its Relation With Milk Yield and Somatic Cell in Mediterranean Italian Water Buffalo](#)

Carlo Boselli , Massimo De Marchi , Angela Costa and Antonio Borghese

**Original Research**

Milkability is defined as the ability of an animal to give a regular, complete, and rapid milk secretion by the mammary gland in response to a proper milking technique. The aim of the present study was to investigate the relationship of milkability ...

Published on 11 August 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00432

15. [Establishment of a Stable  \$\beta\$ -Casein Protein-Secreted Laoshan Dairy Goat Mammary Epithelial Cell Line](#)

Hongyan Zhang , Tianzhen Liu, Boyu Li, Kang Zhang, Dong Wang , Ying Liu, Lijiang Ge, Yunliang Jiang and Feng Su

**Original Research**

Mammary epithelial cells are widely used as models in mastitis research and as tools for mammalian bioreactors; however, the short lifespan of these cells limits their utility. Several mammal epithelial cell line models have been established; ...

Published on 13 August 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00501

16. [Reducing Ruminal Ammonia Production With Improvement in Feed Utilization Efficiency and Performance of Murrah Buffalo \(\*Bubalus bubalis\*\) Through Dietary Supplementation of Plant-Based Feed Additive Blend](#)

Yendrembam Mery Chanu, Shyam Sundar Paul , Avijit Dey and Satbir Singh Dahiya

**Original Research**

The study evaluated the potential of blends of eucalyptus oil and aqueous extract of mulethi (root of *Glycyrrhiza glabra*) to reduce rate of ruminal ammonia production without affecting feed digestion to improve nitrogen utilization efficiency and ...

Published on 18 August 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00464



17. [Increasing the Sustainability of Maize Grain Production by Using Arbuscular Mycorrhizal Fungi Does Not Affect the Rumen of Dairy Cattle \(\*Bos taurus\*\) and Buffalo \(\*Bubalus bubalis\*\)](#)

Antonella Chiariotti , Joan E. Edwards , Gerben D. A. Hermes , Gennaro Catillo , David Meo Zilio , Sabrina Di Giovanni, Hauke Smidt and Luca Buttazzoni

**Brief Research Report**

New approaches are needed to improve the sustainability of feed production and utilization by ruminants. Promising approaches include increased use of buffaloes for more sustainable milk production, and arbuscular mycorrhizal fungi (AMF) to reduce ...

Published on 15 October 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.556764

18. [A Review of Toxoplasmosis and Neosporosis in Water Buffalo \(\*Bubalus bubalis\*\)](#)

Luiz Daniel de Barros , João Luis Garcia , Katia Denise Saraiva Bresciani, Sérgio Tosi Cardim, Victor Sesnik Storte and Selwyn Arlington Headley

**Review**

Toxoplasmosis and neosporosis are diseases with worldwide distribution that are associated with reproductive problems in livestock and responsible for economic losses. This review presents an overview of the current knowledge relative to these ...

Published on 11 August 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.00455

19. [Cryptosporidiosis and Giardiasis in Buffaloes \(\*Bubalus bubalis\*\)](#)

Monally Conceição Costa de Aquino, Sandra Valéria Inácio , Fernando de Souza Rodrigues, Luiz Daniel de Barros, João Luis Garcia, Selwyn Arlington Headley, Jancarlo Ferreira Gomes and Katia Denise Saraiva Bresciani

**Review**

Cryptosporidium spp. and Giardia duodenalis infect the gastrointestinal tracts of animals and humans. Both parasite groups are distributed worldwide and cause significant economic losses in animal productivity. Infected hosts presenting with and ...

Published on 28 October 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.557967

20. [Field Evaluation of the Interferon Gamma Assay for Diagnosis of Tuberculosis in Water Buffalo \(\*Bubalus bubalis\*\) Comparing Four Interpretative Criteria](#)

Alessandra Martucciello , Nicoletta Vitale , Piera Mazzone , Alessandro Dondo , Ivonne Archetti , Laura Chiavacci , Anna Cerrone, Fabrizio Gamberale , Lorena Schiavo , Maria Lodovica Pacciarini , Maria Beatrice Boniotti and Esterina De Carlo

**Original Research**

Bovine tuberculosis (bTB) is a worldwide zoonosis that affects many species of domestic and wild animals. *Mycobacterium bovis* is the main cause of infection in water buffalo (*Bubalus bubalis*) and bovines and is of great concern for human health and ...

Published on 01 December 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.563792

21. [Polymorphisms in TLR4 Gene Associated With Somatic Cell Score in Water Buffaloes \(\*Bubalus bubalis\*\)](#)

Valentina Roldan-Montes, Diercles Francisco Cardoso , Naudin Alejandro Hurtado-Lugo , André Vieira do Nascimento , Daniel Jordan de Abreu Santos , Daiane Cristina Becker Scalez, Ana Cláudia de Freitas , Ana Cristina Herrera, Lucia Galvão Albuquerque, Gregório Miguel Ferreira de Camargo and Humberto Tonhati

**Original Research**

Considering the importance of the diseases affecting the productive performance of animals in the dairy industry worldwide, it is necessary to implement tools that help to control and limit the occurrence of such diseases. As the increased somatic ...

Published on 05 November 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.568249

22. [\*Bubalus bubalis\*: A Short Story](#)

Antonio Humberto Hamad Minervino , Marco Zava, Domenico Vecchio and Antonio Borghese

**Review**

The domestic buffalo (*Bubalus bubalis*), also known as water buffalo or Asian buffalo to prevent confusion with the American bison (*Bison bison*), wrongly named buffalo in North America, comprises two subspecies: the river buffalo (*B. bubalis bubalis*) ...

Published on 01 December 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.570413

23. [First detection of \*Listeria monocytogenes\* in a buffalo aborted fetus in Campania region \(Southern Italy\)](#)

Claudia Esposito , Lorena Cardillo , Giorgia Borriello , Grazia Ascione, Ornella Valvini , Giorgio Galiero and Giovanna Fusco

**Brief Research Report**

*Listeria monocytogenes* (LM) is the causative agent of listeriosis in both animals and humans, representing one of the most severe food-borne diseases in humans. Out of 13 serotypes, only three (i.e. 1/2a, 1/2b and 4b) are responsible for 95% of human ...

Accepted on 12 August 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.571654

24. [The effect of pre-milking stimulation on teat morphological parameters and milk traits in the Italian water buffalo](#)

Angela Costa , Massimo De Marchi , Giulio Visentin, Maria Concetta Campagna , Antonio Borghese and Carlo Boselli

**Original Research**

Water buffaloes (*Bubalus bubalis*) are very sensitive to environmental stimulus before and during milking and this explains why disrupted milk ejections due to blood oxytocin level instability are frequent in this specie. According to the literature, ...

Accepted on 13 October 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.572422

25. [Assessment of Multicolor Flow Cytometry Panels to Study Leukocyte Subset Alterations in Water Buffalo \(\*Bubalus bubalis\*\) During BVDV Acute Infection](#)

Francesco Grandoni , Alessandra Martucciello , Stefano Petrini , Roberto Steri , Anna Donniacuo, Cristina Casciari, Maria Carmela Scatà , Carlo Grassi , Domenico Vecchio , Francesco Feliziani , Giovanna De Matteis , William C. Davis and Esterina De Carlo

**Brief Research Report**

The identification of cross-reactive monoclonal antibodies (mAbs) that recognize orthologous leukocyte differentiation molecules (LDM) in buffaloes has overcome a major impediment limiting research on the immune response to pathogens and development ...

Published on 16 October 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.574434

26. [Which factors affect pregnancy until calving and pregnancy loss in buffalo recipients of in vitro produced embryos?](#)

Wilson Pardini Saliba, Lindsay Unno Gimenes , Roberti Martins Drumond, Henrique Xavier Salgado Bayão, Rossella Di Palo, Bianca Gasparini, Marcello Rubessa , Pietro Sampaio Baruselli, José Nélio Souza Sales, Eduardo Bastianetto, Rômulo Cerqueira Leite and Mucio Túlio Teixeira Alvim

**Original Research**

In vitro embryo production and embryo transfer (ET) in buffaloes has been developed for decades. However, most studies are focused on the donor or laboratory improvements and there is a lack of reports regarding the recipients. Therefore, our aim was ...

Accepted on 20 October 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.577775

27. [On the Effect of the Temperature-Humidity Index on Buffalo Bulk Milk Composition and Coagulation Traits](#)

Angela Costa , Massimo De Marchi , Sabrina Battisti, Marcella Guarducci, Simonetta Amatiste , Giuseppe Bitonti, Antonio Borghese and Carlo Boselli

**Original Research**

Little is known about the effects of high levels of environmental temperature and humidity on milk yield and quality in buffaloes since this species is known to be more heat tolerant than cattle. However, the distribution of sweat glands and the dark ...

Published on 19 October 2020

Front. Vet. Sci. doi: 10.3389/fvets.2020.577758

## UPCOMING EVENTS

### 10<sup>TH</sup> ASIAN BUFFALO CONGRESS 2021 (ABC 2021)

*"Buffalo Production for Food Security and Livelihood"*



## Asian Buffalo Congress **ABC 2021**

June 3-5, 2021 | Nepal

**Welcome to 10<sup>th</sup> Asian Buffalo Congress 2021 (ABC 2021) in Nepal**



***Dear Scientists and Friends,***

Namaste from Nepal

On behalf of Asian Buffalo Association and the Organizing Committee of the **10<sup>th</sup> Asian Buffalo Congress 2021 (ABC 2021)**, I am honored to invite you all to the **Congress in Nepal**. The Congress will be organized from **June 3 to 5, 2021** in Kathmandu, the heritage city of

Nepal. Kathmandu is also famous for Chhoila, a famous local Newari community food made from Buffalo meat.

The theme of the Congress is “*Buffalo Production for food security and livelihood*”.

Buffalo is an important livestock commodity of many Asian countries in terms of its food value and economic contribution. Asia inhabits about 92% of the total world buffalo population. In order to foster research and development on buffaloes in the Asian region, Asian Buffalo Association was established in 1992. Asian Buffalo Congress is the scientific meeting of the Association organized in every 3 years in its member countries.

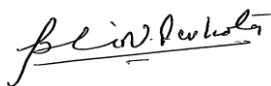
Nepal being a buffalo loving country due to its milk, meat and an overall economic value, we feel proud to host the 10<sup>th</sup> edition of the Congress. This is the first time Nepal is organizing this important meeting. I strongly believe that the congress will provide a unique platform of networking among the scientists, professionals and policy makers not only from Asia, but also from all over the world. Moreover, the scientific deliberations, knowledge sharing and discussions during the Congress will add more scientific value on buffalo research and help addressing the key issues of buffalo production and its sustainable development.

Shortly, we are launching the Congress website and announcing the details of the Congress.

Let us join hands to make the 10<sup>th</sup> ABC 2021 a grand success.

Thanking you all. Stay safe and stay healthy!

Best Regards,



**Prof. Bhuminand Devkota, PhD**

*Organizing Chair*

# 13<sup>th</sup> WORLD BUFFALO CONGRESS

October 10<sup>th</sup>-13<sup>st</sup> ,2022

Wuhan-China



武汉,每天不一样!  
Wuhan, Different Every Day!

Huazhong Agricultural University (HZAU) is a national key university of “Project 211” directly under the Ministry of Education. With a history tracing back to Hubei Farming School founded in 1898 by Zhang Zhidong, governor of Hubei and Hunan province, HZAU enjoys a history over 120 years. The university was entitled National Civilized Unit in 2008 and 2011 and was ranked 11th in the nation among the 72 MOE universities in the latest Performance Appraisal in Higher Education by China’s MOE National Institute for Education Research. Besides, HZAU is ranking the second place of all universities in China in agriculture.

In additional to Huazhong Agricultural University, there are other 6 local Institution / organization will support the 13th WBC, including Chinese Association of Animal Science and Veterinary Medicine, Dairy Association of China, Dairy Association of Hubei province, China Animal Agriculture Association, Buffalo Research Institute of Chinese Academy of Agricultural Science and Guangxi Zhuang National Autonomous Region, Guangxi University, Modern Agricultural Industry Technology System (Dairy Cattle).

## MEMORIES

### HÉCTOR ANTONIO SCANNONE POGGIOLI



Hector Scannone was an agricultural engineer, graduated from the Central University of Venezuela (1979).

In 1980 he moved to San Fernando de Apure to Hato La Guanota, where together with his wife Susana Moser de Scannone, his father-in-law Pablo Moser Guerra and his brother-in-law Pablo José Moser, pioneered buffalo breeding in Venezuela, founded Lácteos La Guanota, the first buffalo mozzarella production company in Venezuela, made Bufito, a dulce de leche de búfala.

He was the promoter along with veterinarians Vicente Silva, Rafael Hoogesteijn and Omar Verde in the Hato La Guanota (Apure) of Venezuela's first genetic improvement center, genealogical

data collection and the first place of artificial buffalo insemination in Venezuela. Founder and former president of Aso buffaloes Venezuela, Former President of Convecar, Former president of Lácteos La Guanota, C A.

Today he was the President of Agropecuaria La Guanota, C A and President of Bufito C A.

In his son's word: *"The most important thing: my dad was a wonderful dad, grandpa, son, brother, brother-in-law, friend, family promoter, humble, generous and tireless worker. Faithful believer in the honest work of Apure, Venezuela and the Buffaloes"*.



In 2020 he celebrated 40 years of honorable, dedicated and passionate profession as a Buffalo producer and promoter. He leaves a beautiful family: his wife Susana, three children, Hector Andrés, María Alesia and Ana Cristina and seven wonderful grandchildren”.

Joao Ghaspar de Almeida

IBF executive officer of America

The IBF federation deepest condolences to the family and friends. Hector Scannone’ s loss will deeply affect buffalo world.



**HECTOR SCANNONE AND HIS WIFE SUSANNA**

## CARLOS MARÍA DE LLANO



Last November 8<sup>th</sup> our great friend and colleague Dr. Carlos María de Llano passed away. He was born in Corrientes, member of an old, traditional family, also based in Paraguay.

He was graduate in Veterinary Sciences from the National North East University (Corrientes). He worked many years as a veterinary, as a farm manager and also as a farmer.

More than twenty years ago he fell in love with buffaloes.

He leaves a large and lovely family, including Mrs. Marcela, his wife, sons and daughters in law, and grandchildren.

He was Vice President of the Argentine Buffalo Breeders Association, Member of the American Buffalo Breeders Federation and Member of the Standing Committee of the International Buffalo Federation.

He has been a great companion on the buffalo road, and a very important buffalo breeder in Corrientes, Argentina. It was a lot of his task to achieve harmony in the works of the American Federation, in the formation of the American Buffalo Species Jury College, in the exhibitions, conferences, tastings, performed for example at the spectacular “Buffalo House” (Caá Catí, Corrientes, Argentina).

His presence in the buffalo networks was permanent. An enthusiastic and tireless buffalo friend and promoter have left us. He leaves a path for the buffalo growth in the American Continent.

Marco A. Zava

Member of the Board of Directors and of the Technical Commission  
of the Argentine Buffalo Breeders Association

## IBF ORGANIZATION

### GOVERNING BODY

**President:** Yang Ligu (China), [ylg@mail.hzau.edu.cn](mailto:ylg@mail.hzau.edu.cn)

**General Secretary:** Antonio Borghese (Italy)

[antonio.borghese@email.it](mailto:antonio.borghese@email.it), [antonio.borghese@live.it](mailto:antonio.borghese@live.it), [antonio.borghese@escorena.net](mailto:antonio.borghese@escorena.net)

**Executive Officer Asia:** Inderjeet Singh (India), [inderjeet.dr@gmail.com](mailto:inderjeet.dr@gmail.com)

**Executive Officer America:** Joao Ghaspar de Almeida (Brazil), [ghaspar@terra.com.br](mailto:ghaspar@terra.com.br)

**Executive Officer Europe:** Luigi Zicarelli (Italy), [zicarell@unina.it](mailto:zicarell@unina.it)

**Executive Officer Africa:** Gamal Hussein Zaza, [zazagamal@hotmail.com](mailto:zazagamal@hotmail.com)

**Executive Officer Australia:** Joanna Miller, [jo@taratoora.com](mailto:jo@taratoora.com)

### SECRETARIAT OFFICE

Antonella Chiariotti (Italy) [antonella.chiariotti@crea.gov.it](mailto:antonella.chiariotti@crea.gov.it)

Giuseppina Maria Terzano (Italy) [marinellaterzano@gmail.com](mailto:marinellaterzano@gmail.com)

Vittoria Lucia Barile (Italy) [vittorialucia.barile@crea.gov.it](mailto:vittorialucia.barile@crea.gov.it)

Carlo Boselli (Italy) [carlo.boselli@izslt.it](mailto:carlo.boselli@izslt.it)

Federico Infascelli (Italy) [federico.infascelli@unina.it](mailto:federico.infascelli@unina.it)

Anna Chiacchierini (Italy) [centrotori@chiacchierini.it](mailto:centrotori@chiacchierini.it)

### STANDING COMMITTEE

Argentina:

Marco Zava, [marcozava@gmail.com](mailto:marcozava@gmail.com); Gustavo Crudeli, [gacrudeli@hotmail.com](mailto:gacrudeli@hotmail.com); Felix Noguera, [aacbufalos@gmail.com](mailto:aacbufalos@gmail.com); Jose Konrad, [konradjl@hotmail.com](mailto:konradjl@hotmail.com)

Armenia:

Shamiryan Vahe [shtrikh@yahoo.com](mailto:shtrikh@yahoo.com)

Australia:

Joanna Miller: [jo@taratoora.com](mailto:jo@taratoora.com)

Bolivia:

Luiss Korc, [Korc@gmail.com](mailto:Korc@gmail.com)

Brazil:

Joao Ghaspar de Almeida, [joaoghaspar@gmail.com](mailto:joaoghaspar@gmail.com); William G. Vale, [wm.vale@hotmail.com](mailto:wm.vale@hotmail.com); [wmv2011@gmail.com](mailto:wmv2011@gmail.com); Antonio Humberto H. Minervino, [ah.minervino@gmail.com](mailto:ah.minervino@gmail.com); Caio Rossato, [michele\\_minoru@hotmail.com](mailto:michele_minoru@hotmail.com)

Bangladesh:

Omar Md Faruque, [faruque\\_mdomar@yahoo.com](mailto:faruque_mdomar@yahoo.com);

Bulgaria:

Tzonka Peeva, [tzonkapeeva@abv.bg](mailto:tzonkapeeva@abv.bg)

Canada:

Martin Littkemann, [mlittkemann@xplornet.com](mailto:mlittkemann@xplornet.com)

China:

Yang Ligu (China), [ylg@mail.hzau.edu.cn](mailto:ylg@mail.hzau.edu.cn); Xiang Li, [xxanglli@mail.hzau.edu.cn](mailto:xxanglli@mail.hzau.edu.cn); Yang Bingzhuang, [gxbri@gxbri.com](mailto:gxbri@gxbri.com); Yangqing Lu, [luyangqing@126.com](mailto:luyangqing@126.com); Yi Zhang, [yizhang@cau.edu.cn](mailto:yizhang@cau.edu.cn); Jiangshua Shang, [jh\\_shang@163.com](mailto:jh_shang@163.com); Huang Jiaxiang, [huangjix080@163.com](mailto:huangjix080@163.com); Yang Zhou, [Yangzhou@mail.hzau.edu.cn](mailto:Yangzhou@mail.hzau.edu.cn); Shujun Zhang, [sjxiaozhang@mail.hzau.edu.cn](mailto:sjxiaozhang@mail.hzau.edu.cn); Xianwei Liang, [liangbri@126.com](mailto:liangbri@126.com)

Colombia:

Juan G. Angel, [juangangel@gmail.com](mailto:juangangel@gmail.com)

**Costa Rica:**

Alvaro Salas Vega, [neloreriocuarto@yahoo.com](mailto:neloreriocuarto@yahoo.com); CANABU C.R., [info@canabucr.com](mailto:info@canabucr.com); Sady Quesada Sanchez, [squesada63@hotmail.com](mailto:squesada63@hotmail.com); Coen Van Hoegee, [cc.vanhoege@hotmail.com](mailto:cc.vanhoege@hotmail.com)

**Cuba:**

C. José Raül Lòpez Alvarez, [jrlopez@ica.co.cu](mailto:jrlopez@ica.co.cu), [jrlavarez@gmail.com](mailto:jrlavarez@gmail.com)

**Egypt:**

Gamal Hussein Zaza, [zazagamal@hotmail.com](mailto:zazagamal@hotmail.com); Laila Nasser Eid, [lailaneid@hotmail.com](mailto:lailaneid@hotmail.com); Mostafa A. R. I. Khalil, [khalilmostafa22@yahoo.com](mailto:khalilmostafa22@yahoo.com); Sheriff Elshenawy, [sh.elshenawy@outlook.com](mailto:sh.elshenawy@outlook.com)

**Germany:**

Andreas Hoeflich, [hoeflich@fbn-dummerstorf.de](mailto:hoeflich@fbn-dummerstorf.de); Julia Brenmoehl, [Brenmoehl@fbn-dummerstorf.de](mailto:Brenmoehl@fbn-dummerstorf.de); Torsten Hemme, [Torsten.Hemme@ifcndairy.org](mailto:Torsten.Hemme@ifcndairy.org)

**Greece:**

Dimitrios Roustemis, [roustemis@mail.com](mailto:roustemis@mail.com)

**Hungary:**

Hungarian Buffalo Breeding Association, [egyesulet@magyarbivaly.hu](mailto:egyesulet@magyarbivaly.hu)

**India:**

Dahiya S.S., [ssdahiya.cirb@gmail.com](mailto:ssdahiya.cirb@gmail.com); Inderjeet Singh, [inderjeet.dr@gmail.com](mailto:inderjeet.dr@gmail.com); Phulia S., [sphulia@gmail.com](mailto:sphulia@gmail.com); Pawan Singh, [pawansinghdabas@gmail.com](mailto:pawansinghdabas@gmail.com)

**Indonesia:**

Abdullah Akhyar Nasution, [abdullah.akhyar@unimal.ac.id](mailto:abdullah.akhyar@unimal.ac.id)

**Iran:**

Hamid Naderfard, [hnaderfard@yahoo.com](mailto:hnaderfard@yahoo.com); Mohammad Nikookar Dashtman, [m.nikookar10@gmail.com](mailto:m.nikookar10@gmail.com); Kourosh Elyasi, [kourosh.elyasi@gmail.com](mailto:kourosh.elyasi@gmail.com); Fatemeh Derisavi, [derisavifatemeh@gmail.com](mailto:derisavifatemeh@gmail.com)

**Iraq:**

Khalid Al-Fartosi, [khalidalfartosi@yahoo.com](mailto:khalidalfartosi@yahoo.com); Jabbar Alsaedy, [kingfisher\\_ja@yahoo.com](mailto:kingfisher_ja@yahoo.com); [alsaedyjabbarkh@gmail.com](mailto:alsaedyjabbarkh@gmail.com)

**Ireland:**

Macroomb Buffalo, [macroombuffalomozzarella@gmail.com](mailto:macroombuffalomozzarella@gmail.com)

**Italy:**

Antonio Borghese, [antonio.borghese@email.it](mailto:antonio.borghese@email.it); Raffaele Garofalo, [r.garofalo@fattoriegarofalo.it](mailto:r.garofalo@fattoriegarofalo.it); Leopoldo Iannuzzi, [leopoldo.iannuzzi@ispaam.cnr.it](mailto:leopoldo.iannuzzi@ispaam.cnr.it); Angelo Coletta, [ctsmamabuffalowst@gmail.com](mailto:ctsmamabuffalowst@gmail.com); Vittoria L. Barile, [vittorialucia.barile@crea.gov.it](mailto:vittorialucia.barile@crea.gov.it); Federico Infascelli, [federico.infascelli@unina.it](mailto:federico.infascelli@unina.it); Giuseppe Campanile, [giucampa@unina.it](mailto:giucampa@unina.it); Anna Chiacchierini, [centrotori@chiacchierini.it](mailto:centrotori@chiacchierini.it); Carlo Boselli, [carlo.boselli@izslt.it](mailto:carlo.boselli@izslt.it); Esterina De Carlo, [esterina.decarlo@cert.izsmportici.it](mailto:esterina.decarlo@cert.izsmportici.it); Domenico Vecchio, [domenico.vecchio@izsmportici.it](mailto:domenico.vecchio@izsmportici.it); Nello Giorgi, [giorgi.nello@libero.it](mailto:giorgi.nello@libero.it); Antonella Chiariotti, [antonella.chiariotti@crea.gov.it](mailto:antonella.chiariotti@crea.gov.it); Emanuela Parlato, [manup9@gmail.com](mailto:manup9@gmail.com); Giuseppe Morese, [info@giuseppemorese.it](mailto:info@giuseppemorese.it); Luigi Zicarelli [zicarell@unina.it](mailto:zicarell@unina.it) (honorary member); Antonio Perrone, [aperrone@wedap.eu](mailto:aperrone@wedap.eu); Antonia Noce, [noce.antoniana@gmail.com](mailto:noce.antoniana@gmail.com); Massimo De Marchi, [massimo.demarchi@unipd.it](mailto:massimo.demarchi@unipd.it); Damiano Altieri, [az.agricola.altieri@gmail.com](mailto:az.agricola.altieri@gmail.com); Giovanni Binotti, [g.binotti58@gmail.com](mailto:g.binotti58@gmail.com); ANASB, [info@anasb.it](mailto:info@anasb.it); [direzione@anasb.it](mailto:direzione@anasb.it); Maria Concetta Campagna, [mariaconchetta.campagna@izslt.it](mailto:mariaconchetta.campagna@izslt.it)

**Mexico:**

Ismael Coronel, [carnedebufalo@hotmail.com](mailto:carnedebufalo@hotmail.com), [contacto@bufalosdemexico.com](mailto:contacto@bufalosdemexico.com); Diego Armando Morales Lagunes, [damorales@earth.ac.cr](mailto:damorales@earth.ac.cr)

**Nepal:**

Bhumi Nanda Devkota, [bhuminand@gmail.com](mailto:bhuminand@gmail.com), [b.devkota@afu.edu.np](mailto:b.devkota@afu.edu.np)

**Nicaragua:**

Cesar Leiva Rodriguez, [cesar.a.leiva@hotmail.com](mailto:cesar.a.leiva@hotmail.com)

**Pakistan:**

Talat Naseer Pasha, [tnpasha@uvas.edu.pk](mailto:tnpasha@uvas.edu.pk); Saeed Hassan Hotiana, [saeed.hotiana@gmail.com](mailto:saeed.hotiana@gmail.com); Muhammad Hayat Jaspal, [hayat.jaspal@uvas.edu.pk](mailto:hayat.jaspal@uvas.edu.pk); Muhammad Hassan Saleem, [dr\\_mhs@uvas.edu.pk](mailto:dr_mhs@uvas.edu.pk); Muhammad Asif Yaseen, [masifabg@gmail.com](mailto:masifabg@gmail.com); Usman Ayaz ;Sami Ullah, [miansamiullah84@gmail.com](mailto:miansamiullah84@gmail.com); Maqsood Akhtar, [crobripattoki@gmail.com](mailto:crobripattoki@gmail.com); Esan Ullah, [ehsaanrai@gmail.com](mailto:ehsaanrai@gmail.com)

**Panama:**

Guillermo Cardenas, [guillermocitricos@gmail.com](mailto:guillermocitricos@gmail.com)

**Philippines:**

Libertado C. Cruz, [pcc-oed@mozcom.com](mailto:pcc-oed@mozcom.com)

**Romania:**

Livia Vidu, [liviavidu@gmail.com](mailto:liviavidu@gmail.com); Ioana Nicolae, [ioana\\_nicolae2002@yahoo.com](mailto:ioana_nicolae2002@yahoo.com)

**Spain:**

Ivan AnsiaVazquez, [ivan.ansia@hotmail.com](mailto:ivan.ansia@hotmail.com)

**Thailand:**

Metha Wanapat, [metha@kku.ac.th](mailto:metha@kku.ac.th); Thuchadaporn Chaikhum-Marcou, [thuchadaporn@hotmail.com](mailto:thuchadaporn@hotmail.com)

**Trinidad:**

Leela Rastogi, [leela3053@hotmail.com](mailto:leela3053@hotmail.com); Lisa Benjamin, [lisabenzamin\\_epi@outlook.com](mailto:lisabenzamin_epi@outlook.com)

**Turkey:**

M. Ihsan Soysal, [misoysal@gmail.com](mailto:misoysal@gmail.com); Ercan Tasleden, [istanbulmanda@hotmail.com](mailto:istanbulmanda@hotmail.com)

**U.K.:**

GENOMED Ltd, [mb@genomed-biotech.com](mailto:mb@genomed-biotech.com)

**USA:**

Thomas Olson, [tcwb@valornet.com](mailto:tcwb@valornet.com); Shannon Gay, [Shannonsfieldservice@yahoo.com](mailto:Shannonsfieldservice@yahoo.com); Caroline Sawyer, [cgsawyer2328@gmail.com](mailto:cgsawyer2328@gmail.com); Joshi Nanda, [Joshin@msu.edu](mailto:Joshin@msu.edu)

**Venezuela:**

Juan Carlos Gutierrez, [juan.gutierrez@fcv.luz.edu.ve](mailto:juan.gutierrez@fcv.luz.edu.ve); Nicola Fabbozzo, [nicolafabbozzo@gmail.com](mailto:nicolafabbozzo@gmail.com); Jairo Fernandez, [jairo\\_fernandez@hotmail.com](mailto:jairo_fernandez@hotmail.com)

**Vietnam:**

Mai Van Sanh, [mvsanh2009@gmail.com](mailto:mvsanh2009@gmail.com); Su Thanh Long, [sulongip@yahoo.com](mailto:sulongip@yahoo.com)

[www.internationalbuffalofed.org](http://www.internationalbuffalofed.org)

[info@internationalbuffalofed.org](mailto:info@internationalbuffalofed.org)

 [IBF-International Buffalo Federation](https://www.facebook.com/IBFInternationalBuffaloFederation)

 [@IBFederation](https://twitter.com/IBFederation)



INTERNATIONAL  
BUFFALO  
FEDERATION

Stay Safe  
and  
Healthy



(PHOTO WEB)

happy  
HOLIDAYS