Buffalo Newsletter

Number 25 - December 2010

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

Another year, 2010 passed away. The world is changing rapidly, in buffalo field too. This is the first number of the Buffalo Newsletter, printed in electronic version and sent on line. This Newsletter was born on 1993, as FAO-ESCORENA Organization founded a system of information and development, the Buffalo Network, with a Newsletter utilized to spread out news, reports, papers in the buffalo world. Now the printing and expedition costs are not more acceptable, but the Buffalo Newsletter (this is the number 25) will follow to exist in electronic version. Moreover the website www.agrowebcee.net, founded by FAO-ESCORENA, including Buffalo Network too, is very active and utilized to find books on buffaloes, Buffalo Newsletters, news and so on.

The International Buffalo Federation (IBF) is more and more active to promote information, projects and Congresses. In October 2009 the 6th Asian Buffalo Congress was held in Lahore (Pakistan), while the 9th World Buffalo Congress was held in Buenos Aires (Argentina) on April 2010. Another International Buffalo Conference was held in New Delhi (India) on February 2010.

The Proceedings of these three congresses are the state of art of the buffalo research in the world.

As many projects are growing to develop buffalo systems and buffalo products, Pakistan was hit not only by terrorism but also by the tragedy of a terrible flood. I invite all to cooperate with a project, coming by IBF and by Rotary International, to give milking buffaloes to the people who lost the family animals in the villages, to obtain milk for the children.

To all the buffalo lovers and particularly to Pakistani people, a happy 2011.

The Editor

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6th Asian Buffalo Congress

October 27-29th, 2009
Hotel Pearl Continental, Lahore-Pakistan

REPORT

THE INAUGURAL SESSION

The inaugural session of the 6th Asian Buffalo Congress was opened by the honorable Chief Mininster of Punjab Mian Muhammad Shahbaz Sharief. On 27th October, 2009 in a prestigious gathering of over 1200 scientists, researchers, professionals, farmers and livestock industry representatives in Crystal halls of Hotel Pearl Continental Lahore. In his inaugural address he said that It is a matter of great pleasure for me to be here on this prestigious Ceremony of 6th Asian Buffalo Congress, organized by the University of Veterinary and Animal Sciences, Lahore in collaboration with Government of the Punjab and Asian Buffalo Association (ABA).

I am also delighted to learn about the participation of more than 100 delegates in the Buffalo Congress from two dozen countries representing all continents of the globe.

The introduction and steady growth of buffalo farming in European countries like Italy, Bulgaria, Holland, Germany, Denmark and France reflects that the interest of developed nations of the world, originally populated by *Bos taurus* is now diverting to scientifically least explored but most potential dairy and meat animal of the world. The successful holding of this scientifically significant International Congress is the living proof of our commitment to **"Buffalo Cause**" and we are fully conscious of our obligations to improve the rural economy of the Province by giving special emphasis to the well being of millions of small holder buffalo farmers by supporting and encouraging latest research and entrepreneurship.

The Government of Punjab has particularly focused on the improvement of Nili and Ravi buffaloes by establishing "Buffalo Research Institute" just next to the Ravi (New) Campus of University of Veterinary and Animal Sciences, at Pattoki to create an ideal synergy between buffalo research and development.

He also added that, I am confident that the galaxy of scientists participating in this meeting will develop future strategies and linkages among themselves and entrepreneurship for enhancing productivity of milk and meat through increasing the extent of research work to **better understand buffalo**. The Government of Punjab is committed for its continued support for the livestock sector.

I congratulate the organizers for developing the scientific program, a National Buffalo Fair at Pattoki and allied activities during this Congress. I feel honoured to host the distinguished delegates of this congress, at a culturally rich and historical venue this evening.

On the opening day of the Congress, the C.M. Punjab hosted a state dinner for foreign delegates and other dignitaries of the congress as a special gesture of traditional hospitality of Lahore and his Government.

THE SESSIONS

Plenary sessions were organized: the first (October 27) on “Present situation and future perspective of buffalo production” (Chairman Prof. M. Nawaz); the second (October 28) on “Genetic improvement in buffaloes for enhanced milk and meat production” (Chairman Prof. A. Borghese); the third (October 29) on “Biotechnology” (Chairman Dr. P. Wyrm). Technical sessions were held on: Buffalo Nutrition and Feed Resources, Environment and Marketing, Buffalo Health, Socioeconomic and Welfare Aspects, Buffalo Breeding and Genetics, Buffalo Management and Reproduction, Buffalo Milk and Milk Products, Farmers and Industry Forum, Future Dairy Treasure. The Proceedings of the Congress, with 569 pages, was edited in Pakistan Journal of Zoology (s.s.) number 9, October 2009 by the Zoological Society of Pakistan.

ABC2009 EXHIBITION

At this occasion a high quality exhibition was also organized, these stalls displayed products ranging from modern dairy equipment to modern feeds and other allied facilities available in Pakistani Livestock Sector. This exhibition was also opened by the honourable C. M. of Punjab Mian Muhammad Shahbaz Sharief. This exhibition proved to be most successful by attracting scores of delegates to visit it and raising awareness about the modern aspects of livestock/buffalo production alongside providing opportunities for the participating commercial companies to introduced their products and create more business opportunities for their companies through national and international networking.

THE CONCLUDING SESSION

The concluding session of the 6th Asian Buffalo Congress was presided over by Speaker Punjab Assembly Rana Muhammad Iqbal. President of the Congress Professor Dr. Talat Naseer Pasha welcomed the honorable chief guest and expressed his gratitude appreciation for all the foreign and Pakistani delegates whose participation under difficult circumstances make 6th Asian Buffalo Congress a rich event and a success story on both aspects of organizational and scientific standards. He especially thanked all the foreign delegates coming from 22 different countries of the world for making such a brave effort to travel all the way from their home countries to Pakistan under presently difficult circumstances and ehanced the richness of the Congress. He specially thanked Chief Minister of the Punjab Mian Muhammad Shahbaz Sharief, Secretary Livestock and Dairy Development Department Punjab Muhammad Jahanzed Khan, the whole organizing team of buffalo congress for making the event a pride for Pakistan and for the University of Veterinary and Animal Sciences, Lahore. The chief guest Rana Muhammad Iqbal, Speaker Punjab Assembly said in his concluding remarks that “I am confident that the global community of buffalo loving scientist would have covered and shared their knowledge and experiences on all aspects of buffalo production at length during the last three days of this prestigious conference. This would significantly add to promote the BUFFALO CAUSE in Asia and rest of the world. He also added that The Government of Punjab is at present, heavily investing for the uplift of the

Livestock Sector of Punjab because this sector serves as a MAJOR COMPONENT OF PROVINCE'S ECONOMY. The total investment toll during 2008 was Rs. 2 billions through different initiatives province, Divisional and District levels. Let me finish with my profound gratitude to his Excellency, the Prime Minister of Pakistan to for gracing this auspcious ceremony with his presence and all those who took pains to travel all the way to Pakistan and making this a real global event".

THE REWARDING MOMENTS:

THE INTERNATION COMMUNITY AND 6TH ASIAN BUFFALO CONGRESS

The University of Veterinary and Animal Sciences, Lahore being the host of 6th Asian Buffalo Congress earned great prides and honors for Pakistan by attracting world leading buffalo experts and scientists from 22 different countries of the world. The galaxy of international scientists participating in the congress included 51 delegates travelling all the way from Australian Continent, Americas, Far East, Arab Countries, Africa, Europe, UK, Scandenavia and South Asia.

The delegates from all over the world were provided four and five star accommodation and stay facilities with a high level security and protocol to make their visit a LIFE TIME EXPERIENCE through enjoying Pakistani hospitality tradition, organizational standards. They were also honored by the Vice Chancellor Dr. Muhammad Nawaz to meet him in his chamber and to welcome them at an informal level. All of them were also provided a chance to visit UVAS and have tour of available research and academic facilities. The worthy Vice Chancellor briefed them about the developments that had already taken place and those in the pipeline and sharing his future vision to make most historical veterinary education institution of Asia a world class institution. All the delegates also enjoyed generous availability of transport facilities for sight seeing and shopping in Lahore which was an enjoyable side line activity highly appreciated by the honorable guests. All the delegates expressed their feelings of gratitude for not only organizing such a high standard Scientific Congress in Lahore but they were also extremely impressed and surprized that "PAKISTAN WAS DEFINITELY NOT A COUNTRY WHAT THEY USED TO KNOW ABOUT IT THROUGH INTERNATIONAL MEDIA, INSTEAD IT IS A BEAUTIFUL COUNTRY, POSSESSING ENORMOUS NATURAL RESOURCES AND THE MOST LOVING AND CARING PEOPLE IN THE WORLD". This was the greatest reward at the time when Pakistan desparately needed it under the prevailing circumstances. Some of the remarks left by the foreign delegates are being quoted for everyone's benefit.

BUFFALO MELA AT BUFFALO RESEARCH INSTITUTE PATTOKI

In addition, under his special instructions the Department of Livestock and Dairy Development Punjab also joined hands to assist in the successful holding of the Congress which organized a color full and very absorbing Buffalo Show (Mela) at Buffalo Research Institute, Pattoki on 30th October, 2009. Speaker Punjab Assembly Rana Iqbal Ahmad Khan was the Chief Guest of the occasion.

Buffalo Show (Mela) in Pattoki

Buffalo Newsletter - Number 25

December 2010

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Rana Muhammad Iqbal, Speaker Punjab Assembly in his address expressed his extended thanks to UVAS and BRI for organizing such a splendid buffalo show to demonstrate world's best buffalo breeds possessed by Pakistan to foreign delegates. He also welcomed all the guests in his home town. The buffalo mela was a colorful event with horse and camel dances, splendid performance of school children, caval cade of Nili, Ravi, Nili Ravi and Kundi buffalo cows and excellent bulls.

6TH ASIAN BUFFALO CONGRESS RECOMMENDATIONS

The Recommendation Committee of 6th Asian Buffalo Congress met on 29th October to finalize the recommendations of the conference to shape up the future of buffalo as the Prospective dairy and Meat Animal. The recommendation committee comprised of:

1.Professor Dr. Talat Naseer Pasha (President)
2.Professor Dr. Masroor Ellahi Babar (Organizing Secretary)
3.Professor Dr. Libertado Cruze (Phillipines)
4.Professor Dr. Antonio Borghese (Italy)
5.Professor Dr. C. Devendra (Malaysia)
6.Professor Dr. S.K. Ranjhan (India)
7.Professor Dr. Nasim Ahmed (Pakistan)
8.Dr. Irfan Zahid (Director General Livestock Punjab)

The committee recommended following measures to be taken for promoting Pakistani Buffalo as the prime dairy and Pakistani Buffalo as the prime dairy and meat breed of the world:

1. Immediate steps must be taken for complete molecular characterization of Nili, Ravi, Nili Ravi and Kundi breeds of Pakistan for their patent registration as Pakistani Buffalo Genetic Resource. Any delays may give a chance to other countries to register it as their genetic resource.
2. It was also recommended to immediately establish BUFFALO REGISTRY SERVICE on the similar lines like NADRA to conduct buffalo census, bringing the whole Punjab buffalo population into a single database.
3. Immediate establishment of Nucleus herds of Nili, Ravi, Nili Ravi and Kundi breeds from amongst pedigreed and elite buffalo population maitained at different livestock farms in Pakistan
4. There is an immediate need to strengthen Semen Production Unit Qadirabad, Sahiwal by the establishment of research wing of SPU to establish buffalo specific cryopreservation SOPs to increase fertility of buffalo semen through A.I.
5. Buffalo Research Institute should be technically and financially further strenthened to come up to its deliver its mandate. Provision of research facilities, environment and trained manpower need to be give high priorities for this purpose.
6. The recommendation committee identified a clear lack of synergy between research academia and livestock and dairy development operations at Government level. The committee therefore stressed upon the need to evolve a permanent mechanism for continued interaction between the two sectors to make a real difference in the promotion buffalo production.

7. As a first step Buffalo Research Institute may be jointly linked with University of Veterinary and Animal Sciences, Lahore and Livestock and Dairy Development Department, Punjab.
8. Improvement of buffalo reproductive efficiency needs special measures to be taken in research. For this purpose substantial funds need to be allocated to overcome this problem through the application of modern reproductive biotechnologies such as MOET, Embry and Semen sexing, the impact of heat stress on buffalo fertility, buffalo nutrition for improved reproduction, breeding management of buffalo, reproductive physiology.
9. Application of Marker Assisted Selection using high throughput genomic technologies combined with selective breeding in the established BUFFALO NUCLEUS HERDS.
10. To establish and strengthen Buffalo specific extension services network to advise farmers on different aspects of buffalo health, reproduction, feeding, breeding and vaccination needs to be established, which could also start an integrated program of buffalo registry services to record valuable data on health, production and reproduction.
11. Special research needs to be conducted to identify growth characteristics of male buffalo calves for beef production and devising feed lot fattening programs to enhance buffalo meat production in the country.
12. Special emphasis needs to be given to denounce "ANTI BUFFALO" Campaign by Cow Lobby interested to replace buffalo with *Bost taurus* by publication of awareness literature on buffalo in dairy and meat industry.
13. Buffalo dairy and feed lot fattening initiatives are needed both at Federal and Provincial levels through SMEDA and L & DD through technical and financial assistance amongst buffalo raising communities.
14. Global TECHNICAL SUPPORT NETWORK between major Buffalo producing nations such as India, Pakistan, Bangladesh, Nepal, Iran, Phillippines, Vietnam, Indonesia, Malaysia, China, Argentina, Brazil, Mexico needs to be established to promote BUFFALO CAUSE.

FUTURE BUFFALO PROMISE FOR THE WORLD

1. International Buffalo Federation and Asian Buffalo Associations to join hands to improve buffalo productivity through complete genome analysis to identify disease resistance, milk production, growth and general well being LOCI to improve this unique species and bring it at par with *Bos taurus*.
2. Development of most effective buffalo breeding policies both at international and national levels by forming a WORLD BUFFALO RESEARCH CONSORTIUM with the help of United Nation's Program for Food and Agriculture (FAO).
3. Raising Buffalo Slogan at the International Level "BUBALINE AN ALTERNATIVE TO TAURINE".

Prof. Talat N. Pasha, Dean Faculty Animal Production&Technology, University of Veterinary and Animal Science, Lahore Pakistan

International Buffalo Conference

February 1-4th, 2010
National Agricultural Science Complex, New Delhi, India

REPORT

The Central Institute for Research on Buffaloes Hisar India organized International Buffalo Conference during February 01-04, 2010 on the theme 'Optimizing Buffalo Productivity through Conventional and Novel Technologies' in association with Indian Society for Buffalo Development (ISBD) and Asian Buffalo Association (ABA) at National Agricultural Science Complex (NASC), New Delhi to commemorate Silver Jubilee of its foundation. Dr S Ayyappan, Secretary, Department of Agricultural Research and Education and Director General, Indian Council of Agricultural Research, New Delhi inaugurated the conference.

In his inaugural address, Dr Ayyappan emphasized that livestock rearing has remained the most effective employment generation and livelihood security enterprise for the uneducated and educated unemployed rural youth. Over the last three decades, livestock sector has consistently accounted for over 4 % of the country's GDP, while its share in the GDP from agricultural sector steadily increased from 14 to 25%, while remaining greater than 20% over the last two decades. He eulogized buffalo as 'the black gold of India' and the preferred dairy animal of the farmers. Dr Ayyappan added that due to high contribution (56 – 57%) of buffalo, today India is the largest milk producer in the world. Dr Ayappan emphasized the need to establish partnership among institutions at international level for quicker results. Prof KML Pathak, Deputy Director General (Animal Sciences), ICAR addressed a phenomenal increase in milk production

Dr. Sethi gives the Golden Buffalo to the Speakers

in India as high as 5.5% per annum during certain periods in last three decades, taking per capita milk availability to 241 g per day from a meagre 124 g per day in 1950s. Dr. C.S. Prasad, Ass. Director General (AN&P), ICAR welcomed the delegates and underlined the importance of buffaloes in economy. Dr RK Sethi, Organizing Secretary of the conference and Director, Central Institute for Research on Buffaloes, thanked delegates and guests for making this program a great success.

One theme session, four symposia, six technical and one plenary session were covered under the technical program of the conference. The conference underlined the need for establishment of a consortium of human resource, bioinformatics and infrastructural facilities to exploit the benefits accruable from buffalo for economic well-being of end users. Improvement of buffalo germplasm through conventional and novel technologies with adequate safeguards was emphasized. About 400 delegates both from India and buffalo raising countries like US, Brazil, Italy, Germany, Australia, Egypt, Iran and Malaysia participated in this conference. Scientists with outstanding contribution to buffalo research and development were awarded on the occasion.

Field visit to the institute and the 'buffalo show' organized in the institute premises at Hisar, which is about 170 km from Delhi on fourth day of the conference, remained quite eventful, especially, for the foreign delegates. More than 100 delegates visited the show. Quality buffaloes and breeding bulls of Murrah breed, reared by the farmers within the breeding tract of this breed in Haryana and also the buffaloes maintained at the institute were the highlights of the show.

Specific recommendations, emanated from various sessions of the conference are:

Theme Session

1. *Need for greater international cooperation and collaboration for improvement of buffalo germplasm through conventional and novel technologies with adequate safeguards.*
2. *Integration of genomic tools with conventional progeny testing and ONBS for efficient and faster evaluation of sires.*

Production Systems

1. *Problems hampering full realization of the potential of buffaloes like late maturity, seasonality of reproduction, scarcity of proven germplasm, lower conception rate from AI and higher level of inbreeding in smaller herds, need to be addressed on priority.*
2. *Emphasis required on authentic animal identification and recording system to establish national data-bases in all buffalo rearing countries, as an essential component of selection and improvement strategies.*
3. *Enactment of policies and programmes for salvaging the neglected calves / germplasm from large urban / sub-urban dairies for meat production.*

Genomics and Biotechnological Interventions

1. *Human resource, bioinformatics and infrastructural facilities to be strengthened through consortium to exploit the benefits accruable from buffalo genome research.*

Climate Change, production and Waste Management

1. Rapid commercialization of buffalo farming is the need of the hour. Hence, addressing concerns of sanitary and phyto-sanitary measures, environmental impact, disease epidemics etc. for development of global market, sustainable productivity and food security.

2. Development of efficient and cost effective waste management systems for mitigating methane emissions and adoption of organic farming, use of biogas and sensitizing the biological control for better utilization of GHGs.

Breeding and Molecular Genetics

1. Molecular characterization for evaluation of breeds, conservation and grading -up. of buffaloes

2. Formulation of National buffalo breeding policy in view of the regional priorities for different breeds and increasing per unit productivity of buffaloes.

3. Impact assessment of the buffalo improvement programme through animal identification, recording and evaluation.

Milk and Milk Products

4. Scientific validation of potential attributes in buffalo milk for health.

5. Value addition to buffalo milk adopting processing technologies for cheese, fermented foods, traditional and nutraceuticals products for international market.

Physiology and Reproduction

1. Development, refinement and subsequent application of reproductive biotechnologies for production of quality buffalo germplasm and its faster multiplication.

2. Production of elite bulls with high fertility using AI.

Meat and Meat Products

1. Research emphasis on developing economic rations for raising male buffalo calves and fattening spent buffaloes for quality meat.

2. Encouragement of enterprisers raising broiler male buffalo calves by creation of disease free zones for meeting domestic and export demands.

Feed Resources Management for Nutrition

1. Devising novel nutritional approaches for buffalo production with special focus on environmental safeguard and improvement in utilization of low quality roughages.

2. Clinical nutrition studies to be undertaken for improved buffalo health and production.

Health

1. Systematic national surveillance of various infectious diseases of buffaloes for economic impact assessment and maintenance of disease free bulls.

2. Devising useful methodologies to reduce adverse effects of climate stress on immunity and vector ecology.

Socio-economic measures and marketing

1. Comprehensive impact assessment of globalization and domestic trade policies on buffalo producers, especially, small holders, to advocate appropriate technological, institutional and policy interventions to convert challenges into opportunities.

Dr. Ramesh Kumar Sethi, Director of Central Institute for Research on Buffaloes, Hisar, India

The papers are published in the Proceedings (Vol. 1, 385 pages), the posters as Abstracts in the Proceedings too (Vol. 2, 172 pages) edited by Indian Society for Buffalo Development.

9th WORLD BUFFALO CONGRESS

The Buffalo in it's promised land: America

April 25-28th, 2010
Hotel Panamericano, Buenos Aires, Argentina

REPORT

From April 25th to April 28th , 2010, the IXth World Buffalo Congress was helded in the Crowne Plaza Panamericano Hotel of Buenos Aires, organized by the International Buffalo Federation and the Argentine Buffaloes Breeders Association. An exceptional assistance was achieved: nearly 500 persons coming from 30 countries of the 5 continents (in alphabetic order): Argentina, Australia, Bangladesh, Bolivia, Brazil, Canada, China, Colombia, Costa Rica, Cuba, Egypt, France, Georgia, Germany, Guatemala, India, Iran, Iraq, Italy, Japan, Mozambique, Nepal, Pakistan, Panama, Paraguay, Philippines, Thailand, United States, Uruguay and Venezuela. 260 full papers were presented, including scientific, technical and productive presentations of excellent level. The facilities of the Panamericano Hotel were spectacular. **In 5 Plenary Sessions and in 11 Simultaneous Sessions were presented papers referred to**: Situation of the Buffalo in Regions of the World, Production Systems, Buffaloes for Draught, Hide, Genetics, Social and Economic Development, Reproduction, Anatomy and Physiology, Nutrition and Feeding, Infectious and Parasitic Diseases, Meat Production, Milk Production, Economy and Markets, Managements in Dairy and Livestock Herds, Clinical and Animal Welfare. The Proceedings of the Congress, with 1102 pages, are published on Revista Veterinaria, Faculdad de Ciencias Veterinaria, Universidad Nacional del Nordeste, Corrientes, Argentina, Vol. 21, 2010, suppl.1, edited by Gustavo A. Crudeli, Exequiel M. Patino, José L. Konrad., included all the papers and was edited by the Veterinary Journal of the North East National University (UNNE), Corrientes, Argentina.

Pre Congress Training Courses: Two courses were realized, both with excellent scientific and technical levels. A Course on Biotechnology of Reproduction, organized by the North East National University UNNE, Corrientes) and the Argentine Catholic University (UCA, Buenos Aires City). And a Course on Dairy Products Manufacturing, organized by the North East National University and the Lujan National University (Luján, Buenos Aires Province).

During the Congress the following meetings were realized: The American Buffaloes Breeders Federation, the Genetics Committee of the above mentioned Federation, and the Standing Committee of the International Buffalo Federation. Also a Commercial Show was realized in the Panamericano Hotel, with several booths of public and private organizations, commercial companies and one of the Government of Corrientes

Province. The cocktail of welcoming on April 25th, 2010, had a great attendance of persons, foreigners and locals. The inaugural and the closing ceremonies were very emotive. Everybody loved the Tango Show, something very representative of Buenos Aires City. **All these realizations were possible thanks to the economical collaboration of the private and public sectors of the country, beginning by the buffaloes breeders. Also were possible thanks to the hard work of an excellent group of persons, including some from foreign countries**. They had little rest during several months. This persons were Members of the Organizing Committee, of the Scientific Committee, Officers of the International Congresses Co., Members of Breeders Associations, and Hosts during the Buffalo Tour (owners of the ranches visited). **The Buffalo Tour began on April 28th by night, moment of the departure from the hotel in Buenos Aires City in three long distance bed busses with 120 "buffalo men and women" on board, coming from all over the world. The tour was done in four days, travelling nearly 2400 kilometres, and visiting buffalo farms in three provinces: Formosa, Chaco and Corrientes, and culminating with a visit to the National Buffalo Show at Corrientes Rural Society, attending to a fluent and successful auction of more than 500 excellent buffaloes of Mediterranea and Murrah breeds, on May 2nd, 2010.**

Formosa and Corrientes Provinces have the 66 % of the buffaloes of the country. Chaco is the third Province in buffalo stock. In Formosa the first visit was to **Isla Verde Ranch,** with 1000 buffaloes, utilized mainly for meat production but lately also for an increasing dairy manufacturing. They have Murrah herds and crossing herds with Murrah males mating. The visiting group was received by the manger and owner, Dr. Ricardo Maglietti. The next visit was to **Santa Ursula Ranch**, where the reception was done by Bernardo Maglietti, the manager and owner, and family. They have 800 buffaloes, in cross herds, mated with Mediterránea males. The principal activity is dairy, and "creole" buffalo cheese manufacturing for local consumption, complemented with buffalo meat production. They have their own store in Formosa City. In Chaco Province the visit was to **Don Enrique and Don Carlos Ranches,** where the group was received by Darío Zaks and family, the owners, and by Dr. Sergio Toer, the manager. They have 800 buffaloes utilized for meat production in low floodable camps near the Paraná River, with crossed herds of very good size and corporal condition, mainly mated with Mediterránea breed. Finally in Corrientes Province the group visited the **Rincón del Madregón Ranch**, being received there by the owners, the Gomez Danuzzo family, and the veterinarian consultant Dr. Gustavo Crudeli. They have 1600 buffaloes, Mediterranea and crosses, including 1050 females, adults and young, all utilized for meat production. In a floodable low camp, where they reach 54 % of calving with vaccines, they achieve a 76 % with buffaloes. The vaccine calves must be sold on the weaning, because they lose corporal condition. The buffalo calves are weaned with 7 months of age, having 220 kg of life

weight. And they are ready for slaughter at 25 months and 460 kg . The buffalo calves born first are sold as a prime quality product to the market with 9 – 10 months of age and 250 kilos of weight ("baby buffalo"). **The Buffalo National Show** was an excellent complement of the previous farm visits, because everybody could appreciate selected animals of the two breeds existing in the country, Murrah and Mediterranea, coming from numerous breeders, most of them not visited during the tour.

This sequence of events included in the programme of the Congress positioned the buffalo in the centre of the national scenery for several days, promoting it's productive goodness and the quality of the products, making available the world buffalo technical and scientific knowledge for the breeders, technical advisors, scientific, researchers, etc. of the country and the region, presenting the argentine buffalo to the world, making possible the personal contact between everybody, between near and distant friends, the information and experience exchange, and starting a new stimulus for the buffalo in the country, with the inclusion of the small proprieties, with the argentine buffalo meat exports to the European Union and with the future increasing of buffalo dairy industry in the country.

Eng. Marco Zava, President Organizing Committee 9th WBC, Executive Director Argentine Buffalo Breeders Association

Plenary Session

Plenary Session

The Speakers

Buffalo Tour

Formosa - Estancia Santa Ursula - Buffalo Asado

Buffalo on Natural Pasture

Corrientes - Buffalo Exposition and Auction Sale

International Buffalo Federation Meeting

April 26th, 2010
Hotel Panamericano, Buenos Aires, Argentina

REPORT

The President Eng. Federico Romero welcomed all the IBF delegates and reported the different running activities about the 9th World Buffalo Congress (April 25-28), that was a success for number of participants, represented countries, quality of lectures and papers, that produced a Proceedings book of 1102 pages, published on Revista Veterinaria, Faculdad de Ciencias Veterinaria, Universidad Nacional del Nordeste, Corrientes, Argentina, Vol.21, 2010, suppl.1, edited by Gustavo A. Crudeli, Exequiel M. Patino, José L. Konrad.

Several Members of the Standing Committee of the IBF were present: for Philippines (Libertado Cruz), Thailand (Rangsun Parnpai, Metha Wanapat, Mrs.Thuchadaporn Chajkun), Costa Rica (Luis Rodrigo Rosales), Italy (Antonio Borghese, Giuseppe Campanile, Angelo Coletta, Luigi Zicarelli, Mattia Casali, Vittoria Barile, Giuseppina Terzano, Leopoldo Iannuzzi, Federico Infascelli, Antonio Fagiolo), Brasil (Otavio Bernardes, Pietro Sampaio Baruselli, Manoel Ossorio Luzardo de Almeida, Joao Ghaspar Luzardo de Almeida), Pakistan (Talat Naseer Pasha, Safdan Sial, Ahmad Ali, Irfan Zahid, Khalid Chaudhry), United States (Thomas Olson), Australia (Barry Lemcke), Colombia (Ricardo Botero Jaramillo, Claudia P. Roldán Calle, Venezuela (Jesús Reggeti Gómez), Egypt (Mrs. Hallah), y Argentina (Federico Romero, Juan P. Nelson, Marco Zava). Also was present Mr. Mohammad Khan, Secretary of Livestock and Dairy Development of the Government of Punjab, Pakistan.

The General Secretary, Prof. Antonio Borghese distributed the IBF list and the order of the meeting with the following points that were presented.

1. IBF activities The activities, as congresses and edited book in buffalo field in the period 2007-2010 were presented in an attached list.
2. Economic balance. The economic balance 2007-2010 with income and outcome were presented in an attached list. The input is coming only from the delegates fees (100 US dollars paid every 3 years) and from FAO. The new IBF list will be composed accordingly with delegates who paid the fees. The output is coming particularly from the cost of the Buffalo Newsletter, very useful for changing information and sending news about buffaloes, but very expensive for printing and expedition cost. Libertado Cruz proposed to ask high fees (1000 US dollars or more) to the official Buffalo Institutes and to the Companies working in buffalo, to increase the input. All the delegates approved, encouraging each other to find Institutes and Companies as IBF delegates.
3. Buffalo Newsletter. The Buffalo Newsletter edited by Antonio Borghese with FAO and IBF logos is a referent point of our activity: in 2009 was published the number 24, sent in 1600 copies, free of charge, to all the people working in buffalo field in many countries, but it is too expensive.

So the proposition to continue the Buffalo Newsletter production, but only in electronic version was voted by the delegates.

4. The Secretary Borghese showed the possibility to involve IBF in research projects: one proposition was presented to the Milano Expo 2015 named "The great farm" with the expo of draught animals (buffaloes too) in the world to produce work and food in the villages; the second project was presented by prof. Leopoldo Iannuzzi with the Italian Buffalo Breeders Association (ANASB) on the possibility to create a reference genome sequence and information on genetic variations of the buffalo species.
All the delegates were favorable to these developing activities of IBF.

5. The Secretary Borghese informed that FAO-ESCORENA organization, that moved the headquarter of the FAO Regional Office for Europe and Central Asia from Rome to Budapest and that includes all the FAO Networks, as buffalo too, organized in Budapest on March 9-11, 2010 the Regional Workshop on the "Development of Thematic Knowledge Networks in the framework of "Coherence in Information for Agricultural Research for Development (CIARD), where prof. Borghese was invited as Coordinator of the Inter-Regional Cooperative Research Buffalo Network. The "agrowebcee.net" portal (Typo 3 CMS) was created as a basis for the management of knowledge.
Now in the website www.agrowebcee.net in ESCORENA Buffalo Network is possible to find a lot of news about buffalo and about IBF (history, constitution and by-laws, activities), books, Buffalo Newsletter and more.

6. Election of the President 2010-2013 and of the country of the next World Buffalo Congress. At this point prof. Borghese remembered as 3 years ago, during the IBF meeting in Caserta, Argentina by Marco Zava and Thailand by Rangsun Parnpai presented their candidatures to host the 9th World Buffalo Congress. At the moment of vote, Rangsun Parnpai renounced to his candidature and decided to support the Argentina proposal, requiring support from all the countries to held the 10th World Buffalo Congress in Thailand in 2013, to avoid the vote that could provoke a division between Asian and American delegates.
Therefore the Secretary proposed Prof. Parnpai as the IBF President for the period 2010-2013.
The assembly elected Parnpai as President with unanimous vote.
The new President Parnpai thanked the delegates and said, as he was elected also President of the Asian Buffalo Association (ABA) during the last Asian Buffalo Congress in Lahore (October 29, 2009), that he will organize the 7th Asian Buffalo Congress together with the 10th World Buffalo Congress in Phuket, Thailand on May 2013. For the first time in the history of IBF and ABA the two congresses will be unified.
This beautiful notice and the enthusiasm of the President Parnpai provoked a great applause and the congratulations of all the delegates.

Prof. Antonio Borghese

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Regional Workshop on the Development of Thematic Knowledge Networks
By FAO-ESCORENA

March 9th- 12th, 2010
Budapest, Hungary

The FAO-ESCORENA organization, that moved the headquarter of the FAO Regional Office for Europe and Central Asia from Rome to Budapest and that includes all the FAO Networks, as buffalo too, organized in March 9-11, 2010 the Regional Workshop on the "Development of Thematic Knowledge Networks" in the framework of "Coherence in Information for Agricultural Research for Development (CIARD)", where Prof. Borghese was invited as the Coordinator of the Inter-Regional Cooperative Research Buffalo Network.
In this occasion the "agrowebcee.net" portal (Typo 3 CMS) was created as a basis for the management of knowledge. Now, in the website www.agrowebcee.net in ESCORENA Buffalo Network is possible to find a lot of news about buffalo and about IBF too, books, Buffalo Newsletter and more.

Dr. Marco Mazzi

VI Buffalo Symposium of Americas

V Buffalo Symposium of Europe and Americas

Havana, Cuba

21 -26 November 2011

BUFFALO TOUR POST SYMPOSIUM:
24 - 26 November 2011

POST SYMPOSIUM COURSES:
28 - 30 November 2011, Havana, Cuba

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Organizer Committee

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Scientific Paper Committee

A. Mitat	Chair
D. Delgado	Co-Chair
R. Ruíz	Executive Secretary

The program includes visits to historical, cultural and patrimonial places throughout the length of simposium. As well as a program for accompanying. A country side tour on November 24 - 26th 2011.

Registration fees:

Activity	Delegate	Student*	Accompanying
Post Symposium course	120 CUC**	120 CUC	-
Symposium	250 CUC	150 CUC	200 CUC
Post Symposium Tour	300 CUC	200 CUC	250 CUC
Course + Symposium	350 CUC	250 CUC	-
Symposium + Tour	500 CUC	300 CUC	400 CUC
Course + Symposium + Tour	600 CUC	350 CUC	-

*** For student registration require a copy certificated by the proper university or college.**

**** 1 CUC= 0.80 USD**

DRAFT PROPOSAL OF SCIENTIFIC AND PRACTICAL PROGRAMME

Date	Time	Place	Activity
Monday 21	All day	National Hotel	Accreditation
Tuesday 22	9:00 AM	National Hotel Plenary Saloon	Opening
	10:30 - 11:30 AM		Masterly Conference: "Results and perspectives of Buffalo rearing in Cuba.
	11:30 AM - 1:00 PM		Impact and prospects of Buffalypso in buffalo breeding in the American continent. Tribute to Professor Steve Bennett.
	1:00 - 2:00 PM	National Hotel	Lunch
	2:00 - 5:00 PM	National Hotel Plenary Saloon	A view of bubaline milk production on tropics.
	2:00 - 3:00 PM	National Hotel Room A	Health Protocols for the movement of genetic material from one country to another.
	3:00 - 4:00 PM		Technical criteria to integrate Genealogical Register in America.
	4:00 - 5:00 PM		Requirement to integrate Genetics Improving Programs.
	9:00 AM - 5:00 PM	National Hotel Room B	Poster session
Wednesday 23	9:00 AM - 12:00 M	Institute of Research on Food Industry	Results of processing of buffalo milk and meat in Cuba.
	9:00 - 10.30 AM	National Hotel Room A	Research necessities in the current agricultural integration environment.
	10:30 PM - 12:00 M		Pre- and postgraduate training and education.
	9:00 - 10.30 AM	National Hotel Room B	Practical application in disease control and buffalo animal welfare.
			Lunch
	2:00 - 4:30 PM	National Hotel Room B	A view of bubaline beef production on tropics.
	4:30 - 5:30 PM		Nutrition in different productive categories and purposes.
	2:00 - 3:30 PM	Hotel Room A	Marketing aspects common for the countries of the area.
	9:00 AM - 4:00 PM	Hotel	Poster Session
	5:00 PM	Hotel Room A	Meeting of the Direction Board of the American Federation of Buffalo Breeders

Date	Time	Place	Activity
Thursday 24	9:00 AM	National Hotel	Departure to Villa Clara
	12:00		Lunch
	2:00 PM	Santa Clara	Visit to "Ché Guevara" Memorial and the city
	2:00 PM	Hotel	Departure "La Nela" farm Sabana-Camagüey Project
	7:00 PM		Return
		Hotel	Dinner – Cuban night
Friday 25	9:00 AM - 1:00 PM	Macún Enterprise	Buffalo meat production on pasture and visit to the enterprise.
	13:00		Lunch
	2:00 PM		Departure from Macún to Varadero
		Varadero	Dinner, stay overnight in Varadero
Saturday 26	9:00 AM	Varadero	Departure to El Cangre Enterprise
	11:00 AM - 2:00 PM	El Cangre Enterprise	Production of buffalo milk on pasture and visit to the Enterprise.
	2:30 - 4:15 PM	EXPOCUBA	Lunch
	4:30 AM		Closing ceremony, presentation of the venue for the next Symposium and the new direction board of the Federation.
	5:30 PM		Fraternize activity

Important Dates:

Tuesday February 1st 2011: Start to receive Completes Papers

Sunday July 31st 2011: Limited day for reception of Completes Papers

Monday November 21st: Starting inscription of Post Symposium course

Saturday November 26th: Clouse of inscription Post Symposium course

Monday 28th: Start Post Symposium course

Post Symposium Courses (28 - 30th November 2011):

1. Buffalo production and management in the tropics (Institute of Animal Science, Cuba)
   Coordinator: Inf. Orlando Fundora
   e-mail: ofundora@ica.co.cu

2. Biotechnology of reproduction and practical applications of molecular markers (Experimental Animal Husbandry Institute, Italy; Research Center of Animal Improvement for Tropical Animal Husbandry; National Center of Animal Health and Havana Agriculture University of Havana, Cuba).
   Coordinators: Dra. Ineida Montes (Cuba)
   e-mail: ineida@cima-minag.cu
   Professors Antonio Borghese (Italia)
   e-mail: antonio.borghese@email.it

3. Buffalo fattening, carcasses quantitative and qualitative features (Institute of Research on Food Industry, Cuba; State University of Sao Paulo, Julio de Mesquita Filho, Faculty of Veterinary Medicine and Animal Breeding, Botucatu, Brazil, Institute of Animal Science, Cuba).
   Coordinators: Professor André Mendes Jorge (Brasil)
   e-mail: andrejorge1@gmail.com
   Ing. Orlando Fundora (Cuba)
   e-mail: ofundora@ica.co.cu

4. Arboreus Systems of Grazing on cattle's (Estación Experimental de Pastos y Forrajes Indio Hatuey
   Coordinator: Ing. Leonel Simón
   e-mail: lsimon@indio.atenas.inf.cu

CONJUGATED LINOLEIC ACID, OMEGA 6 AND 3 IN BUFFALO MILK IN CORRIENTES, ARGENTINA

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ABSTRACT

The objective of this study was the increase of the basal values of conjugated linoleic acid (CLA) and fatty acids omega 3 in milk of buffaloes *(Bubalus bubalis)* fed natural pastures, through a supplementation with sunflower oil (*Helianthus annuus).* 32 multiparous buffaloes of race Murrah and Murrah x Mediterranean crossbred, distributed in 4 groups integrated for 8 animals each, were used. All the groups fed natural pastures *ad libitum;* the group I only with natural pastures, the II received a dairy supplement of 2 kg of ground corn for animal; the III also with corn received 210 ml of sunflower oil for animal and the IV, besides corn received 420 ml of this oil for animal. The test lasted 35 days. In the days 1 and 35 milk samples of all the buffaloes (64 samples) were taken. In CLA significant differences were observed ($p<0,05$) between groups II and III, with maximum values of 18, 54 mg/ g of fat in group III. Average levels of 9,32 and 12,76 mg of omega 6/g of fat for groups II and IV respectively, with significant difference ($P<0.05$), were recorded. There were no differences in the relation omega 6 / 3, among groups. In conclusion the diet III increased the CLA content. ***Key words:*** **Buffalo, milk, CLA, Omega 6 and 3.**

INTRODUCTION

While the fat of ruminant products in many cases is considered harmful to human health for its excessive content on saturated fatty acids, in latest years has been found that a component, the conjugated linolenic acid (CLA), content anticancer properties, in addition to lipolytic activity, prevention of atherosclerosis and diabetes (NRC, 1996).

The CLA is the term used to describe one or more positional and geometric isomers of linolenic acid (*cis-9, cis-12*) containing conjugated double bonds. Duch bonds generally were found in the 9 and 11 positions, or 10 and 12, configuration can be *cis or trans.* Biologically active form of CLA be represented by the isomer *cis-9, trans-11* CLA which represent between 80 to 90 % of total CLA in fat of milk (Belury, 2002).

The linoleic and linolenic acids are essential fatty acids, as they are synthesized by plants, but not by mammals. Must therefore be provided by food and play a role in precursor for the synthesis of polyunsaturated fatty acids (PUFA) of longer-chain and unsaturated n-3 (omega 3) and n-6 (omega 6) respectively (Gagliostro, 2004).

The precursors of CLA are the PUFA

presents in rations of the ruminants as the linoleic acid (*cis-9, trans-12* C18:2) and the α linolenic acid. The first result absolutely in the corn silage, in the cereals and several grains oilseeds as sunflower and soybeans. The α linolenic acid is present in greater quantity in tender pastures and in flax. These compounds suffer a great ruminal biodegradation (Chilliard *et al.* 2000) .

In man were performed studies that demonstrated fatty acids omega 3 eicosapentaenoic acid (EPA), and docosahexanoic acid (DHA) presents hipochoresterolemic properties, antithrombosis and anti-inflammatory (Williams, 2000).

Many authors consider that in human health is more convenient use the relation omega 6 / omega 3 concept instead the individual concentration of the same in food. A relation omega 6 / omega 3 between 6 and 4 prove to be optimal for human food (WHO, 2003).

The principal source of CLA in human diet is milk and dairy products, which contain mainly *cis-9, trans-11* C18:2 (rumenic acid) and *trans-9, cis-11* C18:2.

Many factors may influence in increasing of CLA in milk as seasonal factors and number of lactations (Van Nieuwenhove *et al*. 2004) but undoubtedly the animal diet has the highest prevalence (Bergamo *et al.* 2003).

In buffaloes the research are still scarce, there are very few studies in other countries which determined CLA in milk (Fedele *et al.* 2001; Medeiros, 2002; Lopez Oliveira *et al*. 2004). In our country only recently works about CLA content in milk (Tyagi at al, 2007; Van Nieuwenhove *et al*. 2007; Patiño et al. 2008) and cheese (Van Nieuwenhove *et al*. 2007) have been published.

The objective of this investigation was to know the basal values of conjugated linoleic acid (CLA) and fatty acids 3 (C18: 3 n-3, EPA y DHA) in buffalo milk produced in the province of Corrientes, fed natural pastures and verify if, when diets are supplemented with corn and sunflower oil (*Helianthus annuus*), these values could be increased.

MATERIAL AND METHODS

Geographic place and experimental group: The animals belong to the campus of a establishment located in San Cosme, province of Corrientes. The trial was performed which 32 multiparous buffaloes of Murrah breed and Murrah x Mediterránean crossbred, identified with alpha-numeric ear tag and distributed in four groups, integrated for 8 animals each; 4 buffaloes Murrah breed and 4 half-bred (Murrah x Mediterranean). All groups were fed with natural pastures on grazing; the group I received only natural pastures, the group II received also a dairy supplement of 2 kg of milled corn for animal; the group III also with corn received 210 ml of sunflower oil for animal and the group IV received 420 ml of sunflower for animal. The natural pasture was comprised mostly species like *Andropogon lateralis, A. sellononaus*, *Cynodon dactylon*, *Elionorus sp.*, *Paspalum notatum*, *P. almun chase*, *Sorghastrum agrostoides*, *Desmodium canum* and *Shylosanthes macrosona.* Before starting the test the animals of the groups II, III and IV received a supplement of 1 kg of milled corn during 10 days to adapt them to the consumption of grain.

The animals received the supplement according the treatment at the milking moment in a individual feeder. The buffaloes were milked by hand in the morning. The test was performed during

35 days between the months of October and November 2007, in the corresponding period of the second stage of lactation. The annual average of rain during the year 2007 in the zone was 1.054 mm, when the regular average is 1.690 mm, which shows the pluviometric deficit produced during the year of the test, mainly in the previous four months and during the month of sampling.

Samples: The samples (n = 64) were obtained at days 1 and 35, between the months of October and November 2007, during the milking routine. After eliminate the first jets, 200 ml of milk for each animal were taken. The samples were collected in disposable containers, frozen to -20ºC and packaged in boxes of polyurethane until arrival at the lab.

Laboratory techniques: Each sample was processed in duplicate to obtain the lipid profile. To extract the total lipids, a mixture of chloroform and methanol according to the Bligh and Dyer (1959) technique maintaining nitrogen atmosphere, were used. The conversion of the fatty acids in methyl esters was carried out with NaOH and BF3 methanol to 14 % boiled for 8 minutes. The methyl esters extracted with hexane and were analyzed with a gas chromatograph. Were used Standard of methyl esters of fatty acids of 99% purity (Lipid Standard 189-19 Sigma-Aldrich). The fatty acids composition was obtained in a gas chromatograph of the Agilent signature equipped with a capillary column of 60 mm long and 0,25 mm of internal diameter (Supelco 2340) and a flame ionization detector. The gas chromatography method used (GC-FID) was adapted to the standard ISO 15304 (2002).

Statistical analysis: Statistical analysis on the samples for each treatment (average, standard deviation, coefficient of variation and minimum and maximum ranges) have been applied. Previous the analysis the descriptive behaviour of the sample was evaluated through confidence intervals and graphics *box & whisker. A c*ompletely randomized design, with the additive linear model () was performed.

RESULTS

Conjugated linoleic acid (CLA): The content of CLA in the milk of buffaloes fed the four diets is presented in the Table 1. At day 1 no significant differences between the four groups there were, it was observed at day 35 ($p<0.05$) between the groups II and III. The highest value of CLA in average (18.54 mg / g of fat) of the four groups was obtained at day 35 of test in the buffaloes of group III with a increase of 71,66 % in comparison with the day 1.

Omega 6: The content of fatty acids omega 6 in the milk of the buffaloes fed the four diets is presented in the Table 2. At day 1 no significant difference among the four experimental groups was found, it was observed at day 35 ($p<0.05$) between the groups II and IV.

Omega 3: The content of fatty acids omega 3 in the milk of buffaloes fed the four diets is presented in the Table 3. At day 1 and 35 no significant difference among the four experimental groups was found.

Relation Omega 6 and 3: The relation omega 6 / 3 (mg / g of fat) in buffalo milk is presented in the Table 4. No significant difference among the four experimental groups was found.

DISCUSSION AND CONCLUSIONS

The differences of CLA could be

attributed to the different diets used. It was observed that the concentration of CLA in the group II was the minor of the four groups, this could be attributed at the minimum availability of precursors of CLA in the corn. Instead when is supplemented with sunflower oil, which contains a good linoleic proportion (18: 2 c) induces increase of CLA.

The average values for CLA found in the present work in the group I (exclusive diet based on pastures) both in the day 1 (10,84 mg /g of fat) as at 35 (15,74 mg / g of fat) was higher than the obtained one in Murrah buffaloes (Van Nieuwenhove *et al*. 2004) and in half-bred Murrah x Mediterranean (Van Nieuwenhove *et al*. 2007), in both cases on natural pastures in the province of Tucuman, Argentina.

The highest average value of CLA obtained in the present test, was higher than the registered in Brazil (Lopez Oliveira *et al.* 2004) with diets based on corn and soya oil (5,08 – 10,80 mg / g of fat); in Italy (Fedele et al. 2001; Bergamo et al. 2003) with diets based in organics systems (6,3 – 3,9 mg / g of fat) and traditional (9,0 – 6,2 mg / g of fat) in Mediterranean buffaloes; in India (Tyagi *et al.* 2007) with diets based on corn silage (7,7 – 13, 4 mg / g of fat) in Murrah buffaloes and in Pakistán (Talpur et al. 2005) with concentrated diet based on corn silage (7,1 – 8,0 mg / g of fat) in Nili – Ravi and Kundi buffaloes.

The only value which was slightly lower (17,0 mg / g of fat) to that obtained in the present work was registered in India by Tyagi *et al.* (2007) in Murrah buffaloes fed exclusively clover (*Trifolium alexandrium*).

The diet have a big influence on the content of CLA in ruminant miles and metas because this provides the substrates for the formation of the same (Schmid *et al.* 2006), then it can be assumed that the corn used in the diet II has a minimum presence of precursors of CLA since animals milk presented at 35 days the minor content of this conjugated fatty acids.

However when the diet contains a highest dose of sunflower oil (420 ml) the content of CLA at end of test was increased less than the lowest dose used (210 ml). Then the high quantity of oil disturbed the environment of rumen inhibiting microbial activity responsible of the isomerization and/or ruminal biohydrogenation (Schmid *et al.* 2006).

Other explanation could be that the excess of unsaturated fatty acids caused a certain amount of this escape to microbial modifications and pass directly to the adipose tissue of animals, increasing the content of linoleic acid present in milk. In this case can be verified an increase approximately equal to twice from initial value.

The highest average values of omega 6 was obtained at day 35, in the groups III (9,32 mg / g of fat) and IV (12,76 mg / g of fat), which included in diet the sunflower oil, which indicates the importance of this oil in the diet for increase the content of this fatty acid. Instead in the group II that included in diet only corn showed similar average of group I in omega 6. The highest average value of omega 6 (16,0 – 16,4 mg / g of fat) was obtained in India by Tyagi et al. (2007).

The highest average values of the omega 3 was obtained at day 35 in the group I (4,45 mg /g of fat) with exclusive diet of natural pastures. The others groups including corn and sunflower oil showed lower values of this fatty acid at day 35 in comparison to day 1, indicating

that these foods did not contribute to increase the levels of omega 3 in the fat of buffaloes milk. The highest average value of the omega 3 obtained in the present test (4,45 mg / g of fat) was most lower (14,2 mg / g of fat) than that one found in India by Tyagi et al. (2007), with a diet based on clover, which shows the role of different pastures in the concentration of this fatty acid.

Which respect at relation omega 6 / 3 was observed that this relation is increased with sunflower oil, that has a high content of linoleic acid; however the values obtained are still below the recommended parameters for human intake for the WHO (2003) who suggest optimum relations of omega 6 / 3 between 6 and 4. In India with a exclusive diet based on clover was a relation omega 6 / 3 of 1: 1 (Tyagi et al, 2007).

Table 1: Content of CLA (mg/ g of fat) in buffalo milk of the different groups.

Groups	days	n	average	SD	CV	mín	máx	Dif
I	1	8	10,84	3,37	31.05	7,28	16,73	a
II	35	8	15,74	5,77	36,66	7.85	23,91	ab
III	1	8	10,08	2,79	27,72	5,26	15,30	a
IV	35	7	9,96	3,75	35,89	5,88	15,67	a
	1	8	10,80	2,59	24,03	8,24	16,42	a
	35	8	18,54	5,61	30,27	6,64	26,84	b
	1	8	10,86	2,29	21,05	8,71	15,42	a
	35	7	15,97	7,12	44,59	7,32	24,29	ab

Table 2: Content of omega 6 (mg/ g of fat) in buffalo milk in the experimental groups

Groups	days	N	average	SD	CV	mín	máx	dif
I	1	8	6,67	2,28	34,18	4,42	11,75	a
II	35	7	7,30	1,95	26,65	4,72	9,93	ab
III	1	8	6,80	1,82	26,71	3,76	10,23	a
IV	35	8	5,77	3,75	64,98	2,24	14,16	a
	1	8	7,12	1,99	27,89	5,00	11,55	a
	35	8	9,32	4,75	50,97	3,59	18,19	ab
	1	8	7,01	1,28	18,24	4,94	8,84	a
	35	8	12,76	5,32	41,70	8,75	24,84	b

SD: standard deviation; CV: coefficient of variation; min and max: ranges. dif: difference (Different letters indicate significant differences between averages, $p<0,05$).

Table 3: Content of omega 3 (mg/ g of fat) in buffalo milk in the experimental groups.

Diet	days	N	average	SD	CV	mín	máx	dif
I	1	8	4,03	1,11	27,41	2,95	6,35	a
	35	7	4,45	1,68	37,81	2,74	7,76	a
II	1	8	3,94	0,87	21,97	3,00	5,90	a
	35	8	3,07	1,54	50,10	1,74	6,73	a
III	1	8	4,19	1,06	25,42	3,10	6,52	a
	35	8	3,46	0,74	21,35	2,26	4,39	a
IV	1	8	3,85	1,11	28,89	2,02	6,01	a
	35	8	3,26	0,89	27,19	1,95	4,35	a

SD: Standard deviation; CV: coefficient of variation; min and max: ranges. dif: difference (Different letters indicate significant differences between averages, p<0,05).

Table 4: Relation omega 6 / omega 3 (mg / g of fat) in buffalo milk in the experimental groups.

Groups	Omega 6		Omega 3		Relation Omega 6 / 3	
	day 1	day 35	day 1	day 35	day 1	day 35
I	6,67	7,30	4,03	4,45	1,66 : 1	1,64 : 1
II	6,80	5,77	3,94	3,07	1,73 : 1	1,88: 1
III	7,12	9,32	4,19	3,46	1,70 : 1	2,69 : 1
IV	7,01	12,76	3,85	3,26	1,82 : 1	3,91 : 1
All	6,90	8,84	4,00	3,53	1,73 : 1	2,50 : 1

REFERENCES

BELURY, M.A., 2002. Dietary conjugated linoleic acid in health: Physiological effects and mechanisms of action. *Annu. Rev. Nutr.* 22: 505 – 531.

BERGAMO P, FEDELE E, IANNIBELLI L, MARZILLO G., 2003. Fat-soluble vitamin contents and fatty acid composition in organic and conventional Italian dairy products. *Food Chem* 82: 625-631.

BLIGH, E.G. ; DYER,W.J., 1959. A rapid method for total lipid extraction and purification. *Can.J.Biochem.Physiol.* 37: 911-917.

CHILLIARD, Y.; FERLAY, A.; MANSBRIDGE, R.M.; DOREAU, M., 2000. Ruminant milk fat plasticity nutritional control of saturated, polyunsaturated, trans and conjugated fatty acids. *Ann. Zootech.* 49: 181 - 205

FEDELE, E.; IANNIBELLI, L., MARZILLO, G., 2001**.** Conjugated Linoleic Acid Content in Milk and Mozarella Cheese from Buffalo Feed with Organic and Traditional Diet. En: VI *World Buffalo Congress*. Maracaibo (Venezuela) p. 404 -409.

GAGLIOSTRO G .A., 2004. *Manejo Nutricional para la Producción de Leches de Vaca y de Cabra con Alto Impacto*

sobre la Salud Humana. Area de Investigación en Producción Animal. Ed. INTA- Balcarce y Facultad de Ciencias Agrarias UNMDP (Mar del Plata, Argentina). 84 p.

ISO 15304., 2002 "Animal and vegetable fats and oils"- Determination of the content of trans fatty acid isomers of vegetable fats and oils – Gas chromatographic method. On line: www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm.

LOPEZ OLIVEIRA, R.; FREITAS BARBOSA, M. A. A.; ;MATSUSHITA, M.; DOS SANTOS, G.T.; DUARTES, C.S.; BARROS DE OLIVEIRA, F.; NEVES, C. A.; BATISTA DE OLIVEIRA, P.; SNEL DE OLIVEIRA, M.V.; ELIAS, A. H. N.; LOPES DE OLIVEIRA, R.; PEREIRA, C. S., 2004. Acido Linoléico Conjugado en Mozzarella e no Leite de Búfalas Alimentadas com Diferentes Fontes de Lípideos. *41° Reunião Anual da Sociedade Brasileria de Zootecnia* . (Jaboticabal , Brasil) NR 498: p. 1-4.

MEDEIROS, S.R., 2002. Ácido Linoléico Conjugado: Teores nos Alimentos e Seu Uso No Aumento da Produção de Leite com Mayor Teor de Proteína e Perfil de Ácidos Graxos Modificado. (Piracicaba. Brasil) ESALQ/USP. 98 p. Tese (Doutorado em Agronomia). Escola Sup.de Agricultura Luia de Queiroz.

NATIONAL RESEARCH COUNCIL (NRC).,1996. Carcinogenesis and Anticarcinogenesis in the Human Diet. *National Academy Press*. 242.p. Washington . D.C.

PATIÑO, E.M.; JUDIS, M.A.; GUANZIROLI STEFANI, C.; POCHON, D.O.; CEDRÉS, J.F.; DOVAL, M.M.; ROMERO, A.; FAISAL, E.L.; CRUDELI, G.; REBAK, G., 2008. Determinación de ácidos grasos en leche bubalina (*Bubalus bubalis*) producida en Corrientes, Argentina. *Rev. vet. 19: 1, 28-32*

SCHMID, A.; COLLOMB, M.; SIEBER, R.; BEE, G., 2006 Conjugated linoleic acid in meat and meat products: A review. *Meat Science* .73: 29-41

TALPUR, F.N.; MEMON, N.N.; BHANGER, M.I., 2007. Comparison of fatty acid and colesterol content of Pakistani water buffalo breeds. *Pak. J. Anal. Environ. Chem*. 8, 1&2: 15-20.

TYAGI, A.K.; KEWALRAMANI, N.; DHIMAN, T.R.; KAUR, H.; SINGHAL, K.K.; KANWAJIA, S.K., 2007. Enhancement of the conjugated linoleic acid content of buffalo milk and milk products through green fodder feeding. *Anim. Feed Sci. Technol*. 133(3–4):351–358

VAN NIEUWENHOVE, C.; GONZALEZ, S.; PEREZ-CHAIA, A. RUIZ – HOLGADO, A. P., 2004**.** Conjugated Linoleic Acid in Buffalo (Bubalus bubalis) milk from Argentina. *Milchwissenschaft* 59: 9-10

VAN NIEUWENHOVE, C.; GAUFFIN CANO, P; PEREZ-CHAIA, A.; GONZALEZ, S., 2007**.** Chemical Composition and Fatty Acid Content of Buffalo Cheese from Northwest Argentina: Effect on Lipid Composition of Mice Tissues. *Journal of Food Lipids* 14: 223-243.

WORLD HEALTH ORGANIZATION (WHO)., 2003. Diet, nutrition and the prevention of chronic diseases. Report of join WHO/FAO expert consultation. WHO technical report series 916. http://www.fao.org/docrep/005/AC911E/AC911E00.htm

WILLIAMS, C.M., 2000. Dietary fatty acid and human health. *Ann. Zootech*. 49: 165-180.