

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

INTERNATIONAL BUFFALO FEDERATION HISTORY

The International Buffalo Federation (IBF) was created at the first World Buffalo Congress, that took place on December 27-31, 1985, in Cairo, Egypt. The initiators were the world famous scientists Prof. Dr. M. R. Shalash, President of the Egyptian Veterinarian Buffalo Association and the American scientist Prof. W. Cripe from the University of Florida, Gainesville. The participants of the Congress also approved the organizational structure of the International Buffalo Federation and elected its managing body- the IBF standing committee. As Honorary President the world famous buffalo expert Dr. W. Ross Cockrill (England) was elected. Prof. Dr. M. R. Shalash was elected president with three vice-presidents and 14 members of the standing Committee, including scientists and experts from Australia, Brazil, Bulgaria, India, Italy, China, Pakistan, the USA, Singapore, Thailand, Trinidad and the Philippines. The activity of IBF so far has been in accordance with the statute and rules, developed and approved by the Standing Committee. The 2nd World Buffalo Congress took place on December 12-16, 1988, in Delhi, India, with President Dr. R. M. Acharya and Prof. V. D. Mudgal as Secretary General. The 3rd World Buffalo Congress

took place on May 13-17, 1991, in Varna, Bulgaria, with President Prof. Dr. Tzeno Hinkovski and Prof. Dr. Aleko Alexiev as Secretary General: 10 Proceedings volumes were published plus a special proceeding of the FAO workshop on Biotechnology of Reproduction, that was the first link between FAO and I.B.F., that will produce the foundation of the FAO Inter-Regional Cooperative Research Network on Buffalo. The 4th World Buffalo Congress took place on June 27-30, 1994, in Sao Paulo, Brazil, with President Prof. Manoel Osorio Luzardo de Almeida and Joao Ghasper de Almeida as Secretary General. 3 Proceedings volumes were published. At this congress, the Italian scientist Prof. Giovanni de Franciscis was elected president of IBF. The president de Franciscis organized the 8th Standing Committee meeting of IBF in Rome on April 2, 1996, where the following agenda was carried out: 1, Prof. Shalash was commemorated; 2, The organization and the Scientific programme of the 5th World Buffalo Congress in Royal Palace in Caserta, Italy, was established; 3, an official letter to request the Breeders Associations to pay 100\$ as contribution to organize the congress will be written; 4, The transfer of Secretariat to Istituto Sperimentale per la Zootecnia (Animal Production Research Institute) was

effected; 5, Prof. Sayed Gharieb Hassan from Egypt and Hugh Popenoe from USA are nominated in the Standing Committee. The 5th World Buffalo Congress took place on October 13-18, 1997, in Caserta, Italy; with president Prof. Giovanni de Franciscis and Prof. Antonio Borghese as scientific Secretary. For the first time each paper to communicate to the Congress was submitted to revision of two referees scientist of the specific field, 189 papers were published in the Proceedings, a book of 990 pages, that was distributed before the Congress and represented the

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state of art in buffalo sciences for many years. At this congress, the famous Venezuelan buffalo breeder Mr. Pablo Moser Guera was elected the new president of IBF.

It was decided that the 6th World Buffalo Congress will take place in Venezuela in the year 2000 and the 7th WBC in the Philippines changing each time (3 years) Continent and the new president who will organize the Congress.

The 6th World Buffalo Congress took place in Maracaibo (Venezuela) on May 21-23, 2001 and it produced the first electronic edition of the proceedings in CD. During the business meeting of IBF, prof. Borghese gave a report of the previous congress, that netted a profit of 4,300 \$, which had been transferred to the current congress, and suggested to establish a closer relation with FAO buffalo network. The Standing Committee agreed to establish the Secretariat in Rome in Istituto Sperimentale per la Zootecnia and Antonio Borghese was appointed as General Secretary to be assisted by two Executive Officers: Aleko Alexiev and Hugh Popenoe. The next meeting is to be conducted in the Philippines with Libertado Cruz as President assisted by two Vice-Presidents: s.K. Ranjhan and Jesus Reggeti. Libertado Cruz proposed that Constitution changes could be presented to the General Assembly and voted to the next Congress and the sub-committee, consisted by Libertado Cruz, Joao Gaspar, Antonio Borghese, Hugh Popenoe, proceed with deliberations on the Constitution. In particular: 1, the Constitution needs to be tighter; 2, membership might consist of two members from each country; Country representatives cannot miss more than two congresses or they will be dropped; the official language of the congress will be English and that of the host country; profit from one congress should go to the Secretariat for the expenses and future congresses. The Standing Committee approved the deliberations of the sub-committee.

There were several changes of the IBF Standing Committee members made in the period of 1985-2001.

The managing body of the IBF has the following membership at the 6th WBC:

Honorary President: Dr. W. Ross Cockrill (England)

President: Mr Pablo Moser Guera (Venezuela)

Vice-President for Asia: Prof. Libertado C. Cruz (the Philippines)

For Europe: Prof. Dr. Tzeno Hinkovski (Bulgaria)

For America: Dr. Joao Gaspar de Almeida (Brazil)

Standing committee members:

Eng. Marco Zava - Argentina

Dr. Manoel Osorio de Almeida - Brazil

Prof. Aleko Alexiev - Bulgaria

Prof. K. H. Lu - China

Prof. Wangzhen Quan - China

Dr. L. Garcia Lopas - Cuba

Dr. L. Ricardo Bolero Jaramillo - Colombia

Prof. S. G. Hassan - Egypt

Prof. Kamal Fouad - Egypt

Prof. P. N. Bhat - India

Prof. V. D. Mudgal - India

Prof. Giovanni de Franciscis - Italy

Mrs. Ingrid Caproni - Italy

Dr. Abdul Rahman Khan - Pakistan

Prof. Oswin Perera - Sri Lanka

Dr.C. Devendra - Singapore

Prof. Maneevan Kamonpatana - Thailand

Prof. Charan Chantalakhana - Thailand

Dr. Stephen P. Bennet - Trinidad

Prof. Hugh Popenoe - USA

Dr. Thomas J. Olson - USA

Mr. Jesus Reggeti - Venezuela

In 1992 the Asian Buffalo Association (ABA) was established with president Dr. P.N. Bhat (india).

The last IBF Council meeting took place at the Congress Palace in Rome on August 30th, 2003, organized by the General Secretary, Antonio Borghese and the activity is reported at pages 4-5.

INTERNATIONAL BUFFALO FEDERATION - CONSTITUTION AND By-LAWS

Section I. Name, Address and Nature

1. The International Buffalo Federation (IBF) was founded upon the unanimous recommendation of the General Assembly at the First World Buffalo Congress in Cairo, Egypt, in 1985.

2. The Federation is an independent, non-

political, non-religious and non-profit international organization.

3. The permanent headquarters of the International Buffalo Federation is Rome.

4. The seat of the Federation is the country which will be hosting the World Buffalo Congress.

Section II. Objectives and Activities

- 1.** The Federation objective is to promote the advancement of research and development of Buffaloes throughout the world.
- 2.** It organizes world congresses and roundtables; promotes the exchange and dissemination of scientific and technological knowledge; facilitates the spread of information on buffalo production and development; promotes internationally planned research; enhances the contact among scientists and extension personnel concerned with buffalo production; assists in strengthening the linkage between national, regional and international research; establishes and maintains relations with other organizations whose interests are related to the objectives of the Federation.

Section III. The Official Language

- 1.** The official language at the World Congresses of the Federation is English.
- 2.** The working language of the Secretariat is English.

Section IV. World Buffalo Congress

- 1.** The World Congress shall be held every three years. Regional and National Congresses will not be held in conflict with the World Congress.

Section V. Organization and Institution and Election of Officers

- 1.** The International Buffalo Federation is organized on a regional basis. For the purposes of the Federation, each continent shall be a region.
- 2.** The Institutions of the International Buffalo Federation are the General Assembly, the Secretariat and The Executive Council.
- 3.** The Executive Council of the International Buffalo Federation is composed of the elected Chairmen of the Regional Associations, a Secretary appointed by the President, and the President elected in the General Assembly by the representatives of the National Associations.
- 4.** The Executive Council will be vested of its powers after having been elected (at the end of the World Congress) and its tenure will be for three (3) years.
- 5.** The Executive Council will meet as often as necessary. An absolute majority is the required quorum for the meetings. Resolutions will be approved by a two-thirds vote. The Presidents does not vote except when the vote is tie. His presence however counts for the quorum.

6. Members of the Regional Association will elect their own Executive Councils. The Chairman of the Regional association is by right a member of the International Executive Council.

7. The President of the International Buffalo Federation is elected at the World Congress.

8. Each National Association affiliated with IBF nominates a representative to the World Congress for the purpose of electing the President.

9. National Associations enjoy equal voting rights, being allowed one vote each.

10. Nominations for the candidacy to the Presidency of IBF is submitted to the Executive council six months prior to the World Congress. The Executive Council is responsible of circulating information on the up-coming election and about nominees to all IBF members.

10. The committee organizing the World Congress allocates sufficient time in the official program to hold the election of the President. The election shall be public. Only the official representatives of the National Association, duly appointed by them, are considered electors of the President.

11. The election is to be held by secret ballot. The candidates who obtain the absolute majority, is proclaimed President by the outgoing Executive Council of the International Buffalo Federation.

12.1 If no winner can be proclaimed on the first turn a run-off election is held between the two highest vote getters.

12.2 The President serves for a maximum of two terms.

Section VI. Duties of the President

1. It is the duty of the President to represent the Federation at International meetings, and with International Organizations.

2. To convene the Executive Council as often as necessary or when at least two Regional Chairman ask for it to be convened.

3. To promote the initiatives which will further the knowledge in buffaloes and pursuit the objectives of the federation.

4. To convene the Assembly to discuss the Federation's administration, general program, policies and priorities.

Section VII. Membership

1. National, institutional and individual membership are recognized and encouraged by the International Buffalo Federation. However representation in the Executive Council is

accorded to Regional officers who will be appointed according to the procedures set by in article 6, section IV.

2. Membership in the International Buffalo Federation is renewable by submitting the application form and dues. Deadlines and fees shall be established by the Executive Council. Non-payment of the fees, actually 100\$/year, implies forfeiture of membership status.

3. Membership in the International Buffalo Federation falls into three categories: Collective, Associate and individual members.

3.1 National or Regional associations are Collective members

3.2 Departments and Research Institutes are associate members.

Section VIII. General Assembly Meeting

1. The General Assembly meets at the World Congresses every three (3) years.

Section IX. Amendments of the Constitution

1. In order to amend the Bylaws of the International Buffalo Federation a written notice of the amendments must be circulated to all members in advance of the meeting at which they are to be considered.

2. If a meeting of the General Assembly can

not at that time be called, the membership is allowed to express its vote through a written ballot.

3. The amendment is approved if the majority of the voting members are in favor of it.

Section X. Transitory and Final Provisions

1. This Constitution and By-Laws adopted by the General Assembly of the Federation, in Caserta on October 16, 1997, promulgated by the President of the International Buffalo Federation, will render the former constitution null and void.

2. Elections of the Executive of the Regional Associations shall be called within one year of the implementation of this Constitution and By-Laws.

3. The first IBF Executive Council, under this Constitution and By-Laws, will be composed of the Presidents of the member National Associations until all the regional associations and their executives will not have been set up. The rules pertaining to the quorum and voting regulations shall be the same as those prescribed in article 5 section V of the Constitution and By-Laws

Done in Caserta, Italy, on October 16, 1997

The actual organization of IBF is the following:

International Buffalo Federation

Libertado C. Cruz, *President (Philippines)*
Antonio Borghese, *General Secretary (Italy)*
Hugh Popenoe, *Executive Officer (USA)*

Luigi Zicarelli, *Executive Officer (Italy)*

Honorary Committee

Pablo Moser G. (Venezuela)
Steve Bennet (USA)
Giovanni de Franciscis (Italy)

Vice Presidents

Jesus Reggeti, America (Venezuela)
S. Ranjhan, Asia (India)
Luigi Zicarelli, Europe (Italy)
Barry Lemcke, Australia
S.G.Hassan, Africa (Egypt)

Standing Committee

Brazil
Joao Gaspar de Almeida
William Vale

Argentina
Marco Zava
Armando Rozenblum

Colombia
Ricardo Botero
Berdugo J. A. Gutierrez
Alfonso Bernal

Venezuela
Hector Scannone

Italy
Raffaele Garofalo

Trinidad
Leela Rastogi
Floyd Necles

Cuba
Alina Mitat

USA
Tom Olson

Bulgaria
T. Hinkovski
T. Peeva

India
Siran Uddin Qureshi

Thailand
C. Chantalakana
M. Kamonpatana

Sri Lanka
Oswin Perera
Abeygunawardena

Vietnam
Julio Ly
Zao

China
Yang Bing Zhuang
Xu Dianxin

Philippines
Patricio Faylon

Pakistan
R. Usmani

England
Robert Palmer

Egypt
A.H. Barkawi

Germany
Henzi Heneton

Australia
Barry Lemcke

Turkey
O. Sekerden

Iran
Y.Ruzbehan

INTERNATIONAL BUFFALO FEDERATION EXECUTIVE COUNCIL MEETING

August 30, 2003

Congress Palace, Rome Italy

Attendance:

L.C. Cruz, Philippines	- President
A. Borghese, Italy	- General Secretary
H. Popenoe, USA	- Executive Officer
M. Zava, Argentina	- Member
W. Vale, Brazil	- Member
L. Zicarelli, Italy	- Elected Executive Officer & VP
R. Garofalo, Italy	- Member
O. Sekerden, Turkey	- Member
Y. Ruzbehan, Iran	- Member
M. Larbier	- FAO

The meeting was presided by Pres. Libertado C. Cruz at about 4:00 p.m.

The body posed for few minutes to pay respect and remember the passing away of Prof A. Alexiev, one of the IBF Executive Officers and the Vice President for Europe.

The Agenda of the IBF Executive Council meeting was approved as follows:

AGENDA

- 1 - Approval of the Minutes of the Last Executive Council Meeting, August 21-22, 2001, Macaraibo, Venezuela
- 2 - Matters Arising from the Minutes of Meeting
- 3 - Registration of IBF in Rome
- 4 - Soliciting Official Support of FAO to IBF
- 5 - Finalization of the Constitution and By-Laws of IBF Based on the Macaraibo, Venezuela Meeting
- 6 - Financial Report of the Previous Congress
- 7 - Topics & details of the Next Congress
- 8 - Creation of the IBF Information Hub/Domain
- 9 - Other matters.

1-2. Minutes of the Previous IBF Council Meeting. The minutes of the last Executive Council Meeting reported by Dr. H. Popenoe was approved. The Council focused on the issue of amendments of the IBF Constitutions and By-Laws. Upon presentation by Prof. A. Borghese of the copy of the constitution approved in Caserta, Italy, during the General Assembly in the 5th World Congress, it was concluded that discussions made in Macaraibo, Venezuela have to be deferred for consideration in view of the fact that the reference Constitution used then was that one before the Caserta-approved constitution.

3. Registration of IBF in Rome. The Council agreed to have the IBF be registered in Rome and that Rome be its host country in view of its geographical location and proximity to FAO. Prof A. Borghese agreed to work out for the registration of the IBF using the Caserta-approved Constitution and By-Laws. He requested that member countries/associations pay the needed contributions of \$100 each to cover the IBF registration fee and other related expenses.

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4. Soliciting official FAO support to IBF. The Council agreed that official communication be sent to FAO, Rome to solicit support to the IBF activities. Mr. Larbier, FAO Regional Representative, suggested that we can start by expanding the currently on-going FAO supported project in Europe.

Some Council members expressed interest to seriously push the proposed link with FAO and thought that perhaps the previous letters of intent were not received appropriately at Rome Headquarters.

5. Financial Report of the Previous Congress. Prof. A. Borghese reported that US \$4,300 was forwarded to Venezuela to support the 6th WBC in Macaraibo. It was agreed by the Council that financial report out of the conduct of the last WBC be requested from the Congress host. It was also agreed that should there be some savings out of the last Congress, the same should be made available to support the 7th WBC.

6. Topics of the 7th WBC. The Council agreed on proposals that the theme of the 7th WBC be: "Buffalo Based Enterprises: Prospects for Development under changing trade policies and consumer demand. This has been proposed in view of the emerging global trade rules. This theme is also timely for consideration in view of the identified increases in demand for meat and milk in the global market in which the water buffalo may have significant contributions.

The council also agreed on the proposed pre-congress training on Reproductive Biotechnology to be carried out for about three weeks prior to the Congress proper. This training course will involve young scientists from developing countries in order to strengthen their technical capacities in this important area of biotechnology.

7. Venue of the 8th WBC. Mr. Gaspar de Almeida underlined the possible difficulties for Cuba to organize the 8th WBC. The council agreed to officially communicate with the Cuban representative and get their official position since Cuba has formally offered to host the 8th WBC during the Council Meeting held in Macaraibo. The same offer was accepted by the Council.

8. Election of Executive Officers and Vice President for Europe. In view of the untimely death of Prof. A. Alexiev, Executive Officer and Vice President for Europe, the Council agreed to elect immediate replacement. Prof. A. Borghese nominated Prof. L. Zicarelli to be the IBF Executive Officer and at the same time VP Europe in place of Prof. A. Alexiev. Prof. Zicarelli accepted the nomination and the Council unanimously elected him to the position.

The IBF President expressed thanks and appreciation to the Italian Buffalo Breeders Association and to Prof. A. Borghese for hosting the IBF Council Meeting. Likewise, he expressed appreciation to the FAO Representative, Dr. Larbier and to the members of the IBF Executive Council for their full support.

The Council meeting adjourned at 5:30 p.m.

Attested by:

A. BORGHESE
General Secretary

L. C. CRUZ
President

NILI-RAVI BUFFALO OF PAKISTAN – A KEY TO INCREASE THE BUFFALO MILK PRODUCTION OF THE WORLD

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INTRODUCTION

Pakistan inhabits 24.8 million buffaloes (*Bubalus bubalis*), which are riverian type. There are two major buffalo breeds in the country namely Nili-Ravi and Kundi. Nili-Ravi belongs to the Punjab and Kundi to the Sindh Province. Out of total milk production (27 million tons) in Pakistan, 75 % is contributed by buffalo, despite the 21.8 million cattle population. Dairy farming is a full fledged business along the peri urban area of big cities like Karachi, Lahore, Faisalabad and Pashawar. Landi Cattle Colony has at-least 3000 dairy farms and each maintaining 50-1500 adult buffaloes. These are operating in economically viable environment and are full filling milk demand of over thirteen millions metropolitan population of international city of Karachi. Subsistent & semi commercial farming is observed integrated agri farming throughout the country. Nili-Ravi buffalo has average milk production of 2000 liters per standard lactation of 305 days in peri-urban production system. Breeding of buffalo is mainly through natural mating bulls, however at Govt. Livestock Farms 100% females are inseminated by frozen semen of proven or tested bulls. For bull selection a progeny testing program in which, high pedigreed bulls are selected on the basis of milk production performance of their daughters. These selected bulls are used for improvement of genetic potential for milk in future buffalo population of the country. Govt. Livestock Farms are principal centre for bull production having recorded data. Insemination of selected bulls has increased milk producing animals depicting the highly explorable genetic potential of Nili-Ravi Buffalo of Pakistan. A brief description of two bull dam buffalo from Livestock Experiment Station Bahadurnagar Okara is given below:-

A national champion buffalo of 1984 having brand number K-12/142 with family name "Kuddo" born on 5-3-1974 and was kept at

the station till 11-4-1995 having 21 year herd life, produced 30441 litres of milk in 2645 days in seven lactation of her productive life. She produced 6338 litres and 6535 litres of milk in 379 and 416 days in 3rd and 4th lactations, respectively. The 305 days milk production in same lactations was 5820 and 5694 litres, respectively (Table 1).

A second worth mentioning national champion Buffalo of the year 1995 bearing brand number B-62/4.8 with family name "Bogri" was born on 12-11-1988 completed eight lactations and is still in productive life. Milk produced in 8 lactations is 32740 litres in 2606 days, best yield at 3rd and 4th lactation were 6349 and 5592 litres in 348 and 304 days respectively (Table 1). The average fat percentage of both the buffalo was 6.6% determined by butyric meter techniques. "Kuddo" 12/1.4 produced 2009 kg fat and "Bogri" 62/4.8 yielded 2160 kg fat in their productive life.

The above data indicate a high genetic potential for milk of Nili-Ravi Buffalo breed of Pakistan. Livestock Production Research Institute, Bahadurnagar, Okara Pakistan is running and controlling a progeny testing programme in which the bull calves of such high performing buffaloes are reared for semen production, which is used after testing the milk performance of progeny. In Pakistan semen is produced and stored at Semen Production Units, Qadirabad (Sahiwal), Kalurkot (District Bakhar) and Karaniwala (District Bahawalpur) under the Directorate of Breed Improvement, Punjab Lahore which controls the production and distribution of semen through out the country.

Countries having low milk production can get the semen of high genetic potential animals from Pakistan, where natural mating bulls are also available. The countries having low milk producing buffaloes, can upgrade their animals by using the semen of Nili-Ravi buffalo from Pakistan.

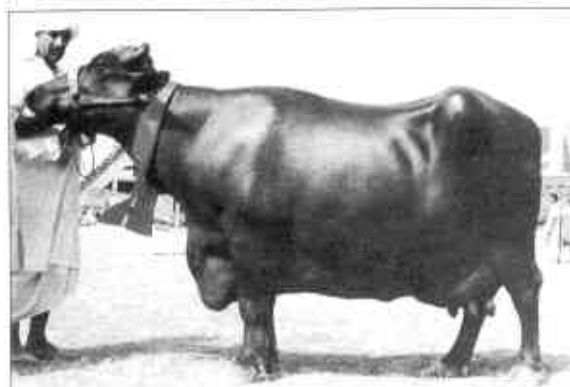


Table 1. Production Performance of Two National Champion Buffaloes of Pakistan.

BNO	DOB	Dam No	Sire No	D.O.S	D.O.C	Lac. No	Lact Length	305day milk litre	Total milk	Fat
K12/14	5.3.74	3330	319	27.2.78	7.1.79	1	379	2363	2730	180.2
				25.8.80	2.7.81	2	354	3438	3991	263.4
				21.2.82	23.1.83	3	379	5820	6338	418.3
				13.10.83	17.8.84	4	416	5694	6535	431.3
				24.5.86	14.3.87	5	434	4355	5039	332.6
				15.7.88	13.5.89	6	383	2704	2900	191.4
				15.2.91	26.12.91	7	289	2488	2908	191.9
						2645 days Av=377	26862 litres	30441 litres Av=4320	2009 kg	
B-6248	12.11.88	B-58/34	BP42	10.11.91	25.9.92	1	416	3428	4135	272.9
				17.10.93	26.8.94	2	298	4207	4207	277.7
				12.12.94	25.10.95	3	348	5877	6349	419.0
				23.02.96	31.12.96	4	304	5597	5592	369.1
				18.03.97	22.1.98	5	313	3711	3732	246.3
				2.05.98	13.3.99	6	309	3090	3159	208.5
				29.8.99	6.7.00	7	269	2520	2520	166.3
				25.9.00	23.8.01	8	329	2440	3046	201.0
						2606 days Av=326	30870 litres Av=3859	32740 litres Av=4093	2160 kg	

DOB=Date of birth - DOS=Date of service - DOC=Date of calving - Lac=Lactation number - Lact length=lactation length

WATER BUFFALO EYE DISEASES A SILENT ECONOMIC LOSS

**Dr. I.H Kathio, DVM, Fellow, FAO-United Nations, Pittston Animal hospital, 4 O'Connell St.,
Pittston, PA 18640, USA, tel 570-655-2412**

**Ahmed Nawaz Tunio, DVM Msc. Surgery, Tando-Jam Animal hospital, Mirpur Khas Rd.,
Tando-Jam City, Pakistan, tel. 92-0221-765442**

Pakistan has a large rural population with agriculture as a major economic force. A great number of water buffalo are found in all villages especially in the Province of Sindh and Punjab, two provinces out of four. The vast majority of farmers have not attended primary or high school. Farming is in a stand still when it comes to modernization. The Food and Agriculture Organization of the United Nations have implemented several projects with the Pakistan government on vaccine development of infectious disease education, yet the silent economic killer diseases remain unattended.

The reasons of such losses are several. Number one is the owner's lack of scientific knowledge about the disease. Number two, the interaction between veterinarian and farmers is occasional. Number three, drugs are not readily available. And, number four, poverty prohibits the farmers from purchasing medicine. A handful of herds were visited by the authors of this article and an astonishing number of the buffalo had lost their eyes. When questioned, farmers replied that they do not know if anything could be done. They are aware of the treatments for problems with udders and

rumen but are not familiar with eye diseases. The eye is a very sensitive structure of the body. The cornea lacks its own supply of blood. A cornea injury is very painful and just a hair line injury can be considered an intense trauma. Even with a small strain to the cornea, a violent response may be directed by the body in the form of inflammation then progressing to granulation (scarring) and finally rendering the structure useless. The loss of vision leads to economic loss for the farmers because the buffalo grazes poorly, milk production is significantly reduced and often they lose body flesh which results in the animal being taken to the slaughter house.

This buffalo had corneal injury which was confirmed with Flurescein sodium retention to cornea (a dye that stains the top layer of the cornea if the cornea is damaged). An ointment with antimicrobe with lubricating property was used every 8 hours. The ointment contained Bacitracin zinc 400 units. Neomycin sulfate 5mg (Equivalent to 3.5 mg Neomycin base) Polymyxin B sulfate 10,000 units per gram in the base containing white petrolatum and mineral oil in 3.5 gram eye ointment tube. Results were remarkable and photo shows normal appearing eye.



Stage 1: Acute painful eye.
Can be treated medically as mentioned in the above caption.



Stage 2: Sub-clinical, sub-acute painful eye.
Can be treated medically as mentioned in the above caption.



Stage 3: Obvious conjunctivitis with entropion.
Can be treated medically and surgically.



Stage 4: Granulation of tissue in the globe. Secondary untreated chronic infection and granulation covering the whole globe. The end result is the loss of the eye due to untreated simple traumatic conjunctivitis.

VARIANCE OF DIRECT AND MATERNAL GENETIC EFFECTS FOR MILK YIELD IN EGYPTIAN BUFFALOES

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ABSTRACT

A total of 1250 normal lactation records of Egyptian buffaloes raised at Mehallet Mousa Experimental Station, belonging to Ministry of Agriculture were used to estimate variances from direct and maternal genetic effects. Data were analyzed by using multiple Trait Derivative Free Restricted Maximum Likelihood (MTDFREML). Two single trait animal model were used. *Model 1* included month and year of calving as fixed effects and age at first calving as a covariate, direct genetic (σ^2_g), maternal genetic (σ^2_m), covariance between direct and maternal (σ_{gm}) and errors as a random effects, while *model 2* is similar to model 1, but excluding σ^2_g and σ_{gm} . Estimates of heritability (h^2) for total milk yield are 0.30 and 0.21 from model 1 and model 2, respectively. The removal of σ^2_g and σ_{gm} from the model decreased h^2 estimates of additive genetic effects by 0.09. Predicted breeding values of cows, sires and dams for total milk yield from model 1 are calculated. The accuracy of sire breeding values are higher than those of cows and dams.

INTRODUCTION

Quantitative traits such as milk traits can be influenced by two genetic components, animal genotype (direct genetic effect) and dam genotype (maternal genetic effects). Maternal effects have been defined as any influence from a dam on its offspring, excluding the effects of directly transmitted genes that affect performance of the offspring (Legates, 1972). Maternal genetic effects are not important for yield traits of dairy cattle (Schutz et al., 1992 and Albuquerque et al., 1998 and Khattab et al., 2003).

Differences in heritability estimates obtained by daughter - dam regressions and paternal half sib correlations have been

considered as an indication of maternal effects for milk yield (Van Vleck and Bradford, 1966). Van Vleck and Bradford (1966) working on first three lactation records of Holstein Friesian cows, estimated heritability from both daughter - dam regression and paternal half sibs correlation. They found that heritability estimates were 0.3, 0.30 and 0.24 from daughter - dam regressions for the three lactations, and the corresponding estimates from half sibs correlation were 0.21, 0.21 and 0.23, respectively. The same authors concluded that the largest maternal effect is in the first lactation, a smaller amount in the second and smaller in the third lactation. In addition, Asker et al. (1965) using another data set of Egyptian buffaloes, found that heritability estimates for total milk yield were 0.27 and 0.49 from daughter - dam regression and paternal half sibs correlation, respectively. The objectives of the present paper was to quantify the contribution of additive direct and maternal genetic effects to phenotypic variance of milk yield in a herd of Egyptian Buffaloes.

MATERIALS AND METHODES

The data used in the present study were obtained from the history sheets of Egyptian buffaloes raised at Mehallet Mousa Experimental Station of the Animal Production Research Institute, Egyptian Ministry of Agriculture. Records covered the period from 1970 to 1993. Number of sires and dams were 134 and 1028, respectively. Cows were mated naturally. Artificial insemination was only practiced when there was a probability of genital disease infection. Pregnancy was diagnosed by rectal palpation 60 days after the last service. The data comprised 1250 normal first lactation record. Abnormal records of cows affected by diseases (such as mastitis and udder troubles) or reproductive disorders were excluded.

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Animals were allowed to graze during the period from December to May. During the rest of the year, they were given pelleted concentrates and rice straw. Cows producing more than 10 kg and those that were in the past two months of pregnancy were supplemented with extra concentrate ration. Buffaloes were hand milked twice a day.

Data were analysed by Multiple Traits Derivative Free Restricted Maximum Likelihood (MTDFREML) according to Boldman et al. (1995), using repeatability single trait Animal Model. Table 1 Shows the data structure considered in the analysis as well as the mean, standard deviation(SD) and coefficient of variability (CV%) for total milk yield. A complete animal model (Model 1), used in the analysis, included the fixed effects of month and year of calving and age at first calving as a covariate and individual, maternal genetic, and residual as random effects. The analysis was terminated after 2448 rounds of iteration, when the convergence criterion was met (Table 1). Starting values for iteration for milk yield were obtained from Albuquerque et al. (1998) (Table 2).

In matrix notation the completed animal model (Model 1) used was:

$$Y = Xb + Zg + Wm + e \dots\dots\dots(\text{Model 1})$$

Where: Y= observations vector of animals, b= vector of fixed effects (month of calving, year of calving and age at first calving as a covariate), g= vector of additive direct genetic effects, m= vector of maternal

(indirect) genetic effects (ability of the dam to provide a suitable environmental, usually termed indirect), and e= vector of random residual effects, and X, Z and W are incidence matrices relating records to fixed, animal and maternal genetic effects, respectively.

It is assumed that

$$\text{var} \begin{pmatrix} (a) \\ (m) \\ (e) \end{pmatrix} = \begin{pmatrix} g_{11}A & g_{12}A & 0 \\ g_{22}IA & g_{22}A & 0 \\ 0 & 0 & I\sigma_e^2 \end{pmatrix}$$

Where

- g_{11} = additive genetic variance for direct effects,
- g_{22} = additive genetic variance for maternal genetic effects,
- g_{12} = additive genetic covariance between direct and maternal effects,
- σ_e^2 = residual variance effect,
- A = relationship matrix,
- I = identity matrix.

Cow breeding values (CBVs) were estimated using their own records, while dam and sire breeding values(DBVs and SBVs),were calculated from 1250 cows, fathered by 134 sires and mothered by 1028 dams. The best linear unbiased estimation (BLUE) of estimable functions of b and the BLUP of g and m in Model 1 are obtained by solving the following mixed model equations (MME). More information about this model are written in detail by Mrode (1996). Another model (2) was fitted but excluding additive maternal effect and covariance between additive direct and maternal effect.

Table 1. Structure of data used in analysis, unadjusted mean, standard deviation(SD) and coefficient of variability (CV%) for total milk yield.

Number	Total milk yield
No. of records	1250
No. of cows	1250
No. of sires	134
No. of dams	1028
ARM	2412
No. of iteration	2448
Mean + SD	1253 + 468
CV %	37.35

ARM = animals in relationship matrix (A^{-1})

Table 2. Additive direct, additive maternal, covariance between direct and maternal, and error variance and covariance values used in estimation of variance and covariance components for milk yield.

component	milk yield
g^2	278
m^2	008
gm	007
e^2	432

g^2 = additive genetic variance effect,
 m^2 = additive maternal genetic variance effect,
 mg = direct and maternal genetic covariance effects
 e^2 = residual variance.

RESULTS AND DISCUSSION

Unadjusted mean total milk yield, standard deviation (SD) and coefficient of variability (CV%) are presented in Table 1. Mean of total milk yield was 1253 kg. The present estimate is lower than the estimate of 2241 kg and 1496 kg reported by *Badran et al. (1991)* and *Tonhati et al. (2000)* working on Egyptian and Brazilian buffaloes, respectively, but higher than that of *Mostageer et al. (1981)* 1160 kg. Estimates of CV % for total milk yield (37.3 %) is lower than that reported by *Khalil et al. (1992)* (43.0 %) and higher than that reported by *El-Arian (2001)* (31.6%) on Indian buffaloes. The large CV % value for total milk yield, reflects a great variation between individuals in such an important productive trait. The differences between present mean and those of other workers could be due to differences in climatic and management conditions and/ or genetic differences in herds. The analysis was finished when it reached the attained convergence with 2448 round of iteration (Table 1). *Swalve and Van Vleck (1987)* used records of 4000 cows to estimate genetic parameters for milk yields of first, second and third lactations with an animal model, only 18 rounds of iterations were realized, while, *Albuquerque et al. (1995)* indicated that some runs stopped after 300 rounds. In general, number of iterations required to reach convergence could be affected by the number of animals, the number of random factors in the model and even specific to particular traits.

Variance components and mean values for variance and covariance components as ratios of phenotypic variances from model 1 and model 2 are reported in Table 3. The variance for additive maternal genetic effects was 0.001 % of phenotypic variance, and the covariance between maternal and direct genetic effects was 0.015 %. Thus, these effects did not contribute importantly to phenotypic variance. Similar trend was found by *Albuquerque et al. (1998)* in the analysis of milk traits (milk yield, fat yield and fat %); they found that the variance of additive maternal genetic effects varied from 0.8 to 1% of phenotypic variance, and the covariance between maternal and direct genetic effects varied from 0.7 to 2.5%. In this respect, *Khatab et al. (2003)* analysing 2059 normal lactation records of a commercial Holstein Friesian herd in Egypt, arrived at the same results. While, *Schutz et al. (1992)* using an

animal model, estimated large values for ratios of variances for maternal genetic effects to phenotypic variances for milk yield (2.58%) and for covariances between maternal and direct effects for milk yield (5.99%) Maternal genetic effects have been described in domestic mammals such as swine (*Southwood and Kennedy, 1990*) and beef cattle (*Dodenhoff et al., 1999*) and represent an environmental effect on the growth of offspring from birth to weaning. However, dairy calves are separated from their dams at birth so that the influence of the dam would be only through intrauterine environment (*Albuquerque et al., 1998*).

Estimates of heritability for 305 day milk yield are 0.30 and 0.21, estimated from model 1 (full model) and model 2, respectively (Table 3). The removal of additive genetic maternal effects and covariance between direct and maternal effects from the model (model 2) decreased estimates of heritability of direct genetic effects by 0.09. In this respect, *Albuquerque et al. (1998)* found that heritability estimates for milk yield of direct genetic effects increased by 0.014 when additive genetic maternal effects and covariance between direct and maternal genetic effects are removed from the analysis. The same authors, also concluded that, some confounding between direct and maternal genetic effects should be expected because the dam that contributes the maternal genetic effect also transmits half of her genetic value for direct effects in her daughter. Some cows do not have lactating daughters, and many sires do not have any lactating granddaughters.

In other words, the present results also suggest that additive maternal genetic effects and covariance between maternal and direct genetic effects do not seem to make important contributions to the phenotypic variance of milk yield, probably because the only environmental influence of the dams on their calves is from conception to birth. Also, *Schutz et al. (1992)* and *Khatab et al. (2003)* arrived at the same conclusion, and found that maternal genetic effects are not important for yield traits of dairy cattle.

In addition, *Roughsedge et al. (2000)* working on 55230 Holstein Cows in UK, using two animal models with and without maternal effects, found that heritability for 305 day milk yield were 0.436 and 0.436 with and without maternal effects, respectively. The same authors reported that no significant

components of variance was attributed to maternal effect. Considering moderate h^2 estimates for total milk yield (full model: 0.30, Table 3), the present results suggested that efforts could be done on the improvement of milk yield through individual selection as well as better managerial practice. In this respect, *Tonhati et al. (2000)* on Murrah Buffaloes in Brazil, found that h^2 for total milk yield, was 0.38. The authors, concluded that the genetic change for this trait is possible by selecting the most productive animals.

In general, heritability estimates obtained in the present study are higher than those reported with sire model by *Khattab and Mourad (1992)* and *Khalil et al. (1992)* being 0.17 and 0.015, respectively on Egyptian buffaloes, *El-Arian (2001)* (0.17) on Indian buffaloes. In addition, *Albuquerque et al. (1995)* working on first lactation yields of milk, fat and protein from Holstein cows in New York and California, using multi trait Animal Model, found that heritability for milk yield were 0.30 and 0.33 for New York and California, respectively. The same authors concluded that heritability estimates with animal models vary, but most are higher than those obtained with sire models.

(Table 3). In general, the variability of heritability estimates in the present study and reviewed studied may be due to differences in: (1) the genetic constitution of the breeds, (2)

the available number of observations used, (3) the structure and distribution of the data set, (4) the models applied for each set of data to correct for the non - genetic factors, (5) the level of inbreeding and coefficient of relationship in the parent population and (6) the method of analysis and estimation. (Table 4). Estimates of genetic parameters for milk yield of dairy cattle obtained with sire model are frequent in the literature. Genetic variance might be underestimated if selection intensity is larger for males than for females. Animal models take into account differential selection of males and females and provide more accurate estimates of parameters than do sire models (*Albuquerque et al., 1995*). In the present study (Table 4) we took into account all variation sources: Cow breeding values (CBVs), Sire breeding values (SBVs) and Dam breeding values (DBVs). The present results showed that the range of CBVs, SBVs and DBVs are 453 , 713 and 546 kg, respectively, representing 36.15 % , 56.90% and 43.58 % of the herd average, respectively. The present results show large differences among breeding values of cows, sires and dams for total milk yield. Thus, the improvement of milk production through selection is possible. Genetic progress can be achieved if the farms adopt test for the genetic evaluation of sires and cows. In this respect, *Khattab and Mourad (1992)* using another data set on Egyptian buffaloes,

Table 3. Phenotypic and genetic variance and covariance for milk yield using two Models.

Model	g^2	m^2	gm	p^2
Model 1	61246 (0.30)	282 (0.001)	3163 (0.015)	204153
Model 2	61002 (0.21)			290486

g^2 = additive direct genetic effect, m^2 = additive maternal genetic effect, gm=covariance direct and maternal genetic effects and p^2 = phenotypic variance.

Table 4. Range of breeding values through cows (CBVs), sires (SBVs), dams (DBVs) and accuracy for total milk yield as estimated from full model (Model 1).

CBVs					SBVs					DBVs				
Beeding Value			accuracy		Beeding Value			accuracy		Beeding Value			accuracy	
Min	Max	range	Min	Max	Min	Max	range	Min	Max	Min	Max	range	Min	Max
-193	260	453	0.53	0.56	-354	359	713	0.58	0.79	-259	287	546	0.33	0.34

estimated sire values without A-1 for total milk yield. The authors found that BLUP values as deviation from the mean ranged from 147 to 154 kg.

It is clear that the accuracy of sire breeding values ranges from 58 - 79 % which was higher than the accuracy of both CBVs (53 - 56%) and DBVs (33-34 %). The results showed the important role of sires, due to the large number of daughters per sire. Khattab et al.(2003) obtained the same results on Holstein Friesian cattle. Also, Table 4 shows the importance of cows, having a wider range of breeding values for total milk yield than dams. Thus, selection for cows for the next generation in maternal line would place emphasis on good genetic maternal effects. The accuracy of dam breeding values are lower than those obtained for cows, and this may be due to the small amount of information available for each dam.

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FACTORS AFFECTING MILK YIELD AND MILK CONSTITUENTS IN BRAZILIAN BUFFALOES

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ABSTRACT

Between 1995 and 2002 milk tests were conducted in 11 buffalo herds in Brazil's São Paulo state, with the purpose of studying the factors which affect breeding of these animals in the country. The milk was weighed monthly at the farms and samples were taken for later analysis and quantification of the content of fat, protein, lactose and total solids. 3587 lactations stemming from 1634 animals of the upgraded Murrah breed were recorded. For the study of the factors affecting the yield of milk and its constituents the fixed effects farm, year, order and season of calving and month of the milk test were included in the mathematical model. The findings revealed means for the traits total milk yield (MY), daily milk yield (DMY) and content of fat (%F), protein (%P), lactose (%L) and total solids (%TS), of 1713.83 ± 576.26 , 6.40 ± 2.12 , 6.06 ± 0.98 , 4.20 ± 0.32 , 5.05 ± 0.31 e 17.38 ± 3.32 , respectively. This study showed in conclusion that the effects of farm, year, month and order of calving should be taken into account for optimal cattle management and comparison of individual performance levels, for selection purposes.

INTRODUCTION

The Brazilian buffalo herds registered a marked increase in numbers over the past decades, with a tendency to stabilize at approximately 1.16 million heads (*Anualpec, 2002*). Nowadays, many breeders opt for milk production in view of the handsome return produced by this activity, due to the higher yield of dairy products, particularly "Mozzarella" cheese. This yield is attributed to the constitution of the buffalo milk which possesses higher content of constituents

(proteins, fat, lactose and total solids). For a better performance of the productive chain of milk, it is necessary to use an efficient zootechnical data tracking and management system, characterized by milk tests. These tests can be conducted daily, weekly, fortnightly or monthly, and they consist of individual weighings of the milk produced, samplings for analysis of its constituents and guidance of breeders in respect to optimal installations and milking procedures, nutritional and sanitary aspects. The data thus collected are used to determine zootechnical indices such as the lactation period, total milk yield during lactation, calving forecasts, production peaks and beginning of dry periods. Knowledge of these indices gives breeders among other advantages better conditions to decide between maintaining or culling of one animal in the herd, furthering selection with a view to improve the yield and quality indices of the milk and its by-products, thus adding greater value to the final products. It should also be stressed that improved genetic value of these animals increases their monetary value. The establishment of milk tests also makes possible the creation of data banks which permit conduction of fairly precise genetic evaluations of the animals, furthering improvement of desirable traits within the herds. The production process requires knowledge of the environmental factors affecting directly the milk yield and composition and which must be taken into account for achieving optimal cattle management and greater efficiency of the selection programs. Among these factors, *Unrikar and Deshpande (1985)*, *Agarwal et al. (1987)*, *Marques (1991)* and *Tonhati et al. (2000)* reported that the year, order and season of calving have a significant influence. The month of the milk test should also be

considered, because it allows to evaluate production efficiency of the animals during lactation.

Thus, this study focused on Buffalo herds raised in São Paulo state and which participated in the Milk Test Program conducted by the Zootechnical Department of UNESP/Jaboticabal; its objective was to assess the variations occurred in the yield and quality of milk produced on milk test day and over the whole lactation period, as a result of the environmental factors such as farm, calving year (ADP), calving order (ODP), calving season (EDP) and month of milk test (MCL).

MATERIALS AND METHODS

Origin of data

Information used in this paper stems from the Buffalo Milk Test Program conducted by the Zootechnical Department of the Faculdade de Ciências Agrárias e Veterinárias/Unesp-Jaboticabal, SP., Brazil. At present, 11 farms participate in that program, 7 of which are situated near the municipality of Registro in the Rio Ribeira valley, and the other herds are located in the State's central region. These herds are composed of the Murrah breed and its crossbreds, raised on grasslands of, mostly, *Brachiária* and *Panicum*. As a rule the practice of feed supplementation is adopted, principally during the dry season (April to September), consisting of shredded sugar cane or grass silage as a filler, and concentrate of cotton seed, barley and soy beans. A mineral salt mix is regularly fed and the system of natural breeding or the use of artificial insemination is adopted. The health checks of the herds are conducted in accordance with the recommendations of the Ministry of Agriculture. The control of ectoparasites and endoparasites is achieved by administering drugs twice a year, on average. The herds in the Ribeira valley are milked once a day and the other herds are milked twice a day; the cows are milked with the calf standing by, in order to perform the milkings and weigh the milk drawn from each animal. The California Mastitis Test (CMT) is also performed with the purpose of detecting possible cases of subclinical mastitis. After weighing, a milk

sample of each animal is taken, identified and dispatched for analysis.

All the samples taken are appropriately preserved in potassium dichromate, packed and dispatched to the Laboratory for Lactation Physiology at the Milk Clinic located at the Campus of ESALQ-USP / Piracicaba-SP, where the analyses for content of fat, protein, lactose and total solids take place and a somatic cell count (CCS) is performed. The analyses of the constituents are obtained by infrared light absorption with equipment Bentley 2000, and the CCS is performed by fluxometric cytometry with a Somacount 500 apparatus. Total data collected from the milk tests such as weights, constituent and CCS analysis results, genealogy and general records for each animal are consolidated into a computerized database, using a specific software for data management denominated Interherd, developed by Inter Agri.

Statistical Analyses

Making use of the database containing the weighings from the milk tests, the total (MY) and daily (DMY) milk yields, and the content of fat (%F), protein (%P), lactose (%L) and total solids (%TS) were evaluated, based on 3587 lactations of 1634 buffalo cows, from 1995 to 2002. For the purpose of data analysis, animals with less than 3 milk tests, calving order higher than 6 and lactation period of less than 100 days were excluded from the file. Up to 305 lactation days (MY) were considered for determination of total milk yield. For the study of the factors which affect the yield of milk and its constituents, the fixed effects of herd, year, order and season of calving and month of milk test were included in the mathematical model. The variance analyses were conducted by means of the GLM procedure from the statistical package SAS (1993) and compared by doing the Tukey test. The model adopted was:

$$Y_{ijklmn} = \mu + F_i + E_j + C_k + B_l + O_m + e_{ijklmn}$$

where:

Y_{ijklm} = Observed yields of milk, fat, protein, lactose and total solids;

μ = overall mean;

F_i = fixed effect vector of i th herd ($i=1 \dots 11$);

E_j = fixed effect vector of calving time ($j=1 \text{ e } 2$);

C_k = fixed effect vector of test month ($k=1\dots 10$);

B_l = fixed effect vector of l^{th} calving year
(for milk, 1995 to 2002; for the constituents fat and protein, 1997 to 2002 and for lactose and total solids, 1998 to 2002);

O_m = fixed effect vector of m^{th} calving order ($m=1\dots 6$);

e_{ijklmn} = residual random effect vector.

RESULTS AND DISCUSSION

The daily average milk yield (DMY) obtained in this survey was $6,40 \pm 2,12$ kg with a variation coefficient (CV) of 33.24%. This value was higher than those shown by Brazilian and Indian studies, i.e. 4.64 kg (Shabade et al., 1993), 4.52 kg (Macedo et al., 1997) and 6.05 kg (Duarte et al., 2001), but lower than the values observed in a survey conducted in Italy (8,50 kg, Bava et al., 1997). From Figure 4 it can be seen that the production peak occurred during the second test (month) reaching a milk yield of 7.22 kg, with subsequent drop in production until the end of lactation. The analyses indicated that all environmental factors taken into account, i.e. calving year, calving order, herd effect, calving season (dry or wet season) and month of milk test, affected the daily milk yield (Table 1) during lactation of the buffalo cows. For total milk yield (MY) the mean found was 1713.83 ± 576.26 kg, CV being 33,62%. Values close to these were found in Brazil, with variations between 1029.31 ± 234.29 to 1496.00 ± 605.7 kg (Marques, 1991; Tonhati et al., 1996). In Italy Rosati and Van Vleck (2002) found a mean of 2286.80 kg. These differences may have occurred due to varying handling techniques and genetic material of the animals. Table 1 shows that except for the factor calving time, all the environmental effects affected this trait.

For fat yield the mean content found was $6,96 \pm 0,98$ % with 14,11% of CV. This value is similar to those found in the literature, varying between 6.71 and 8.59% (Tonhati et al. 2000; Sindhu and Singhal 1988; Macedo et al. 1997; Rosati and Van Vleck, 2002). From Figure 1 it can be seen that the fat content drops during the second test month,

rising thereafter. This fact can be justified by the negative phenotypic correlation between the milk yield and %F (Tonhati et al, 2000; Rosati and Van Vleck, 2002); thus, when yield reaches peak, the fat concentration is diluted, increasing again while the milk yield diminishes. For fat content the calving time was the only environmental factor which did not affect the trait (Table 1).

The average protein content observed in this study was 4.20 ± 0.32 % with 7,52% of CV. Values close to this were also found by Tonhati et al. (2000); Sindhu and Singhal (1988), Macedo et al. (1997) and Rosati and Van Vleck (2002), varying between 3.60 and 4.55%. A slight decrease of protein content during the second test can be observed from Figure 3, with a later tendency to stabilization. Again, the calving time effect (Table 1) was the only one not to affect this trait.

For the lactose and total solids content, the values found in this study were 5.05 ± 0.31 % with 6.28 % of CV, and 17.38 ± 3.32 % with 19,13% of CV, respectively, being close to those observed in the literature (Peeva, 1997 and Duarte et al., 2001). Figure 2 shows that the lactose concentration accompanies the lactation curve, peaking during the third test month and decreasing thereafter. For total solids the concentration shows to be inversely proportional to the milk yield, i.e. it increases while the milk yield diminishes during lactation. As shown in Table 1, only the calving time did not affect significantly lactose yield, and with regard to the content of total solids the factors year, order and time of calving did not alter significantly the trait. Figures 5 and 6 show the influence of the calving orders on the assessed traits. For the daily milk yield the production peak occurred during the third calving order, whereas in respect to the total accumulated yield the highest yields were observed during the 5th calving. As regards to the other traits (fat, protein and lactose) the influence of the calving order was significant, but the percentages did not vary greatly between the different calvings.

The effects of the year of calving on the traits are shown in Figures 7 and 8. The data used for this study were collected from 1995 to 2002 as regards to daily and total yields, and

from 1998 to 2001 as regards to milk constituents. Calving year effects on production traits can be explained by the variations in handling techniques over the period studied, as well as by the culling or sale of the less productive animals, i.e., selection of the animals based on their yield. The calving time affected only the DMY (5.6 v. 5.2 kg milk) in a significant manner (Table 1). The time of highest yield was the wet season during which the animals find an abundance of fodder. A significant difference between the herds tested was found (Table 2). The handling techniques are different from farm to farm, in particular as regards to feeding, which may account for the higher yield of some farms as compared to others. Another important factor is the genetic constitution of the herds and the fact that the practice of genetic selection - used by few breeders only - increases the average performance of these herds above the others.

CONCLUSIONS

- Adequate cattle management allows to overcome the difficulties connected with the effects of the dry and wet seasons on milk yield and quality.
- For optimal cattle management and comparison of individual performance levels for selection purposes, the effects of herd, year, order and month of calving should be taken into account.
- Yield and quality levels of buffalo milk in the Brazilian environmental conditions demonstrate that this species may be a good option for the cattle farmer, contributing to the generation of income and strengthening man's ties to the soil.

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Table 1. Variance analysis of the environmental effects for the daily (DMY) and total (MY) milk yields and content of fat (%F), protein (%P), lactose (%L) and total solids (%TS).

Causes of variation	Values of F					
	DMY (kg)	MY (kg)	%F	%P	%L	%TS
Farm	549,63*	519,97*	183,26*	221,77*	14,32*	21,93*
Calving year	98,45*	52,90*	11,79*	46,32*	59,72*	1,65 ^{NS}
Calving time	17,94*	11,35 ^{NS}	2,38 ^{NS}	3,74 ^{NS}	9,56 ^{NS}	0,06 ^{NS}
Calving order	48,57*	48,93*	9,27*	8,02*	5,05*	1,39 ^{NS}
Test month	519,65	210,75*	525,50*	381,52*	288,09*	35,90*

* = P<0,01 / NS = not significant values

Table 2. Mean for the daily (DMY) and total (MY) milk yields and content of fat (%F), protein (%P), lactose (%L) and total solids (%TS) for each farm.

Farms	Traits					
	DMY (kg)	MY (kg)	%F	%P	%L	%TS
1	8,78	2367,93				
2	6,99	1926,94				
3	7,14	2104,47	6,35	4,41	5,04	17,48
4	5,39	1407,32	7,46	4,33	4,98	18,11
5	4,69	984,36	7,07	4,21	5,11	17,75
6	2,94	784,04	5,86	3,76	5,08	15,94
7	5,13	1417,20	7,41	4,54	5,02	18,32
8	4,90	1359,39	7,34	4,39	4,98	18,08
9	5,08	1429,85	7,28	4,43	4,90	17,92
10	4,99	1290,91	6,27	4,19	4,91	16,65
11	3,99	1184,5	6,89	4,46	4,99	17,70

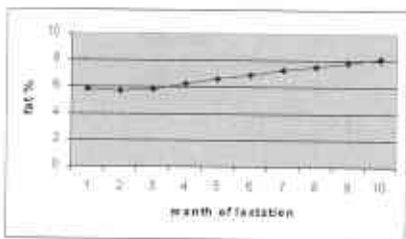


Fig. 1 - Trend of fat content during lactation

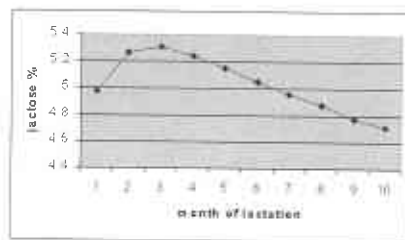


Fig. 2 - Trend of lactose content during lactation

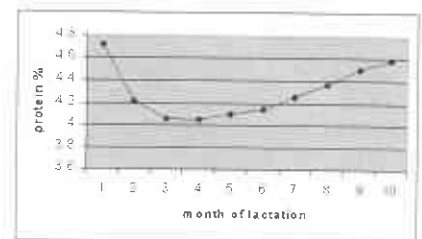


Fig. 3 - Trend of protein content during lactation

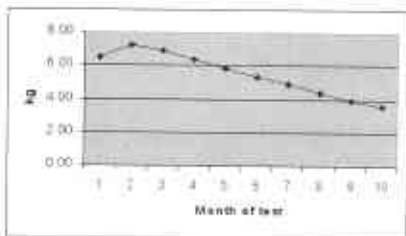


Fig. 4 - Trend of daily milk yield during lactation

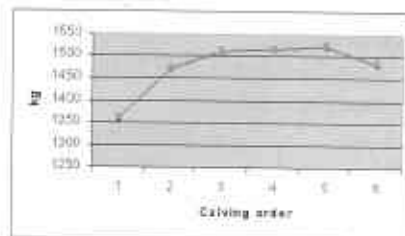


Fig. 5 - Trend of daily milk yield according to calving order

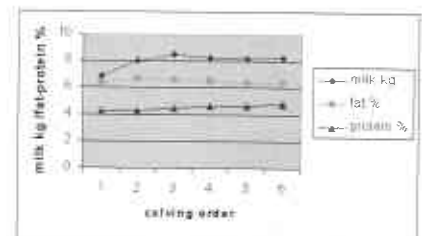


Fig. 6 - Trend of milk yield and constituents according to calving order

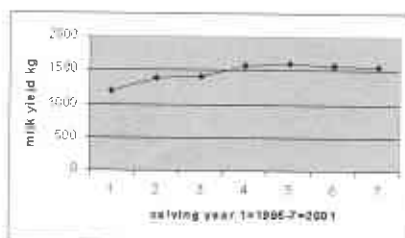


Fig 7 - Trend of milk yield according to calving year

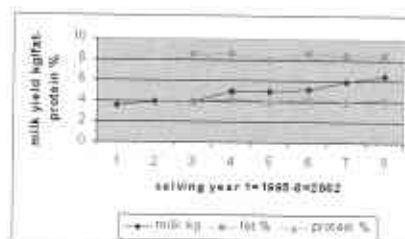


Fig 8 - Trend of milk yield and lactose according to calving year.

RELATIONSHIP BETWEEN SPERM PRODUCTION AND THE SIZE OF TESTIS OF MALE BUFFALO

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INTRODUCTION

To fulfill the demand of protein for the people, it is needed to maximize to develop the livestock resources, including both small and large animals. One of the animal which is common kept by the farmer is buffalo (*Bubalus bubalis*). Buffalo originally come from the east, and is reared not only in Asia but also in Middle East, Russia and some of European Countries.

In general in Indonesia buffalo is kept traditionally by small holder farmers. There are two categories of the buffalo i.e. swamp buffalo and river buffalo, although they are in the same species. Keeping buffalo is actually very useful for the farmer. People can use the buffaloes as draft animals and in addition, they produce meat and milk which is consumed by the people.

On the other hand, buffalo is not favorable as cattle for the farmer to keep. Only the farmers who live in rural area on the countryside keep buffaloes. Due to the benefit, it is important to develop the buffaloes and increase their quantity as well as quality. Concerning that matter, it is necessary to gain some information including both basic and applied information which close to the reproduction aspect. Due to the requirement, it is necessary first to gain basic information within reproduction knowledge to develop buffalo reproduction. Based on that matter, the author conducted a research on the relationship between sperm production and the size of testis of male buffalo. This research will be applied in the field in term to select male buffalo for good reproduction. This is useful since up to now their mating is still natural. In this case if there is a positive correlation between the size of testis and its sperm production, therefore one of the criteria to choose a male buffalo for good reproduction is the size of testis.

MATERIALS AND METHODS

This research used 30 testes of male adult

buffaloes from a local slaughter house in Bandung. Those testes were placed in glasses completed with ice to keep them fresh, in order to stabilize their structure. The testes consist of left and right sides but this research used both side randomly.

Testis Measurements.

Samples were measured for their diameter, length, weight and their volumes. The diameter were measured by a caliper (*jangka sorong*), the weights were measured by analytical balance, their volumes were measured by deep them inside a scale baker glass filled with water.

Testes Scrapping

Take five parts from each testis, each part of one gram weight and grinded in a mortar added by physiologic salt solution. Make a swap preparatory on object glass of the grinded samples and examine the sperms under the microscope to be counted.

Sperm Counting

Sperms were counted over several view of one object glass under the microscope, with a counter. A sample from one testis was counted five times and found the average. The amount of sperm counted meant the amount of sperm of one gram per testis. It is meant that the whole amount of sperm produced in one testis is the weight of testis multiplied the amount of sperm per one gram of the testis.

RESULT AND DISCUSSION

The shape and size of the testis differ one over another individual, but the structure is the same. Each testis consists of a group of *seminiverous* tubules which covered by thick fibers called *tunica albuginea* (Frandsen, 1981). Testis is a male main reproduction organ. Histological, it has double functions. First, testis is as an exocrine gland which yields sperm and second as endocrine gland which yields testosterone hormone. Sperm cells are yielding within *seminiverous* tubules. These sperm cells will be transported to epididymis ducts. In the

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epididymis ducts, the sperm will be matured and as the sperm deposit. Testis lies in *praepubis* area, covered by a sack named scrotum and hanged by *funiculus spermaticus*. The shape of testis is ovoid and its consistency is soft.

Buffalo reproduction organ is similar to the cattle, in shape as well as in its structure. A slightly difference is on the size. Buffalo testis is small compare to its big body. Left testis is smaller than the right one. There is no change of testis position in scrotum of buffalo in term of changing temperature. The testis is normally placed within the scrotum (Camoers, 1976).

A table referred from Suparna 1982, shows, volume of buffalo semen ejaculated is between 0.5 – 4.5 ml on the average of 2.5 ml. Its concentrate is between 200 000 – 800 000 sperm cells and on the average of 600 000 cells per ml semen. According to Verma et al, 1965, a 10 -12 years old male buffalo, with both testis weigh of 167 gram, has sperm total of 15.260×10^6 . According to Suparna 1982, there is a positive correlation between weight of testis and body weight. The correlation between body weight and testis weight is $r = 0.85$ and deposit of sperm in epididymis $r = 0.92$ is significantly different.

The relationship between testis weight and sperm cells amount.

The measurement of testis weight and total sperm cells is showed in *table 1*. The above data shows a significant positive correlation $r = + 0.998$ between testis weight and total sperm cells. With regression of: $Y = - 5 581.10 + 230.27 (X)$. This regression equation could be used to predict Y value based on X, therefore the heavier the testis weight, the more amounts of sperm cells. This result is similar to the one obtained in similar research on goat, which shows the semen ejaculated from a male goat is

related close to the diameter of testis which has been influenced by the animal's body weight. This means the heavier the body weight of the goat, the larger of testis diameter and the amount of sperm cells is also higher. (Suparna, 1984).

The significant relation between diameter of testis and the amount of sperm cells which is ejaculated is close to the size of testis and its sperm production. The size of testis which is more influencing sperm production is its weight. The relationship between diameter and weight of testis is showed as linear line equity (Hahn et al, 1979). This is meant the longer the diameter of testis the heavier its weight. According to Salisburry et al, 1978, 80 % of testis weight consists of *semiferi tubules* where spermatogenesis happened.

The relationship between testis volume and sperm cells amount.

The measurement of testis volume and total sperm cells is showed in *table 2*. The above data shows a significant positive correlation $r = + 0.97$ between testis volume and total sperm cells. With regression of: $Y = 9 374.59 + 122.04 (X)$. This regression equation could be used to predict Y value based on X, therefore the higher the testis volume, the more amounts of sperm cells.

The relationship between testis diameter and sperm cells amount.

The measurement of testis diameter and total sperm cells is showed in *table 3*. The above data shows a significant positive correlation $r = + 0.94$ between testis diameter and total sperm cells. With regression of: $Y = -13 540.27 + 8 071.28 (X)$. This regression equation could be used to predict Y value based on X, therefore the wider the testis diameter, the more amounts of sperm cells.

Table 1. Analysis of Variance of the relationship between testis weight and the amount of sperm cells.

Source	DF	SS	MS	F test	F 0.05	F 0.01
Regression	1	573 947 583.06	573 947 533.06	6 069.98	4.20	7.64
Rest	28	2 674 542.86	94 555.10			
Total	29	576 595 125.92				

follows page 22 

Table 2. Analysis of Variance of the relationship between testis volume and the amount of sperm cells.

Source	DF	SS	MS	F test	F 0.05	F 0.01
Regression	1	537 295 884.32	537 295 884.32	382.81	4.20	7.64
Rest	28	39 299 241.60	1 403 544.34			
Total	29	576 595 125.92				

Table 3. Analysis of Variance of the relationship between testis diameter and the amount of sperm cells.

Source	DF	SS	MS	F test	F 0.05	F 0.01
Regression	1	506 216 415.86	506 216 415.86	201.40	4.20	7.64
Rest	28	70 378 710.08	2 513 525.36			
Total	29	576 595 125.92				

Table 4. Analysis of Variance of the relationship between the length of testis and the amount of sperm cells.

Source	DF	SS	MS	F test	F 0.05	F 0.01
Regression	1	509 145 713.68	509 145 713.68	211.36	4.20	7.64
Rest	28	67 449 412.24	2 408 907.58			
Total	29	576 595 125.92				

The relationship between the length of testis and sperm cells amount.

The measurement of the length of testis and total sperm cells is showed in *table 4*. The above data shows a significant positive correlation $r = + 0.94$ between the length of testis and total sperm cells. With regression of: $Y = -12 018.67 + 3 167.89 (X)$. This regression equation could be used to predict Y value based on X, therefore the longer the testis, the more amounts of sperm cells.

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PRESS RELEASE Handbook on Innovative technologies for Ethnic Dairy Food

Technology of Indian Milk Products

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India's ethnic dairy specialities are emerging as the next gourmet food. A flourishing market for India's milk products is also expanding overseas, largely among some 20 million Indians living overseas. In North America alone, its value is estimated at US \$500 million among four million South Asians.

The handbook documents a new trend in Indian dairy industry that promises to strengthen its organized modern sector into a viable and vibrant entity. This development has become possible as a result of innovative technologies developed for mechanized production of India's ethnic dairy sector. Already, brands like Amul, Nestle, Mother Dairy and Britannia are tapping this booming market that accounts for 95 per cent of all milk products consumed in the country.

These technical advances are creating new economic opportunities for a range of agri-business enterprises to expand avenues for enhanced income. These exciting developments have triggered a revolution that is transforming the socio-economic life of millions of farmers. All this signifies the start of the second phase of the White Revolution.

The handbook provides

<<http://www.indianmilkproducts.com/aboutthebook/overview.htm>> Overview of the Indian dairy industry, supported with 34 statistical tables as well as a number of graphs and charts. Its one highlight is the presentation of findings of a survey and analysis of the market for ethnic dairy foods, conducted by the Institute of Rural Management, Anand (IRMA) on our behalf.

Through this handbook, dairy and food professionals would have access to key technical information, needed for processing milk into traditional milk products. This data is supported with problem-solving tips, processing characteristics, analytical tests, product specifications, labelling information, food safety regulations and the like. This technical data and guidelines that are useful to dairy technologists, product developers, production managers, manufacturers and suppliers of ingredients, inputs, services and equipment, consultants to dairy and food industry.

Topics Covered

Topics covered include:

- Principles of processing that deal with composition and process characteristics of raw milk, including its hygienic handling and recommended practices
- Basic commercial and technical information on ingredients used in product formulations
- Process development including production planning and implementation that is supported with more than 75 flow diagrams, mass-balance charts
- List of equipment required and various technical aspects of packaging.

Indian Delicacies

The technology of as many as 50 Indian dairy delicacies is presented, grouped under the following five major headings:

- Desiccated semisolid milk products
- Coagulated cheese-like products
- Fermented/cultured yogurt-like products
- Fat-rich butter-oil-like products
- Milk rice-pudding-like desserts and puddings

Management Systems

Different management systems for product quality and food safety such as ISO and HACCP have been dealt with at length. These aspects are becoming increasingly important to win consumer confidence in domestic and export market. Nutrition and health aspects of these products are also discussed in a separate chapter.

Sections

The book is divided into seven sections:

- Section I:
<<http://www.indianmilkproducts.com/aboutthebook/overview.htm>> Overview
- Section II:
<<http://www.indianmilkproducts.com/aboutthebook/processing.htm>> Principles of Processing
- Section III:
<<http://www.indianmilkproducts.com/aboutthebook/technology.htm>> Technology
- Section IV:
<<http://www.indianmilkproducts.com/aboutthebook/industrial.htm>> Industrial Production
- Section V:
<<http://www.indianmilkproducts.com/aboutthebook/newvistas.htm>> New Vistas for Industrialization
- Section VI:
<<http://www.indianmilkproducts.com/aboutthebook/nutrition.htm>> Nutrition and Health
- Section VII:
<<http://www.indianmilkproducts.com/aboutthebook/buyers.htm>> Buyers' Guide & Who's Who

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TECHNICAL NOTE

Delayed insemination results in higher conception rates

Second Annual Report of the project titled "Improvement of AI in Dairy Buffaloes in NWFP Pakistan" was presented. According to results of the study the animals inseminated up to 16.0 hours led to a pregnancy percentage of 42% and had a uterine tone of 2.14 at the scale of 1 to 3. The respective values for animals inseminated after 16 hours were 72% and 2.23. The P value was 0.28.

It appears that before 16 hours of commencement of estrus the graffian follicle is under development, associated with an inclining estrogen levels and uterine tone reaching up to maximum beyond that critical period. Therefore after that critical period the chances of getting pregnant, increase.

Under the field conditions the owners are not aware of the fact that rebreeding of buffaloes within 60-90 days postpartum will increase their profit and decrease cost of production per unit. The farmers are usually afraid of a decrease in milk production of lactating buffaloes if bred. The farmers bring their animals to AI centers according to their will which may not be the proper time of insemination. Early or very late insemination may not result in proper conception rate. Our findings suggest that the buffaloes may be inseminated during 16-23 hours after the commencement of the estrus and the message needs to be passed on to field Veterinarians and farmers. It was concluded that late inseminations were followed by better fertility as compared to early inseminations.

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