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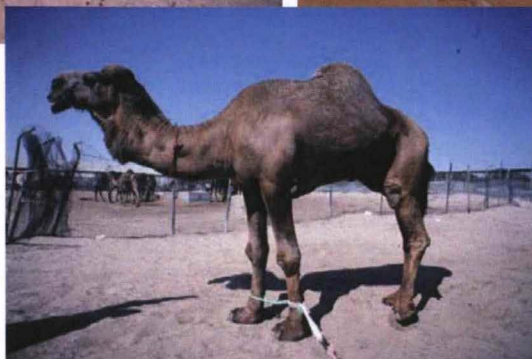
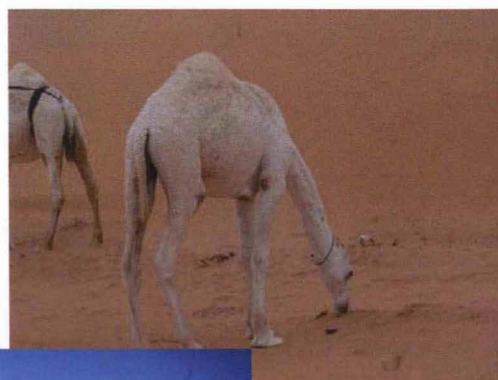
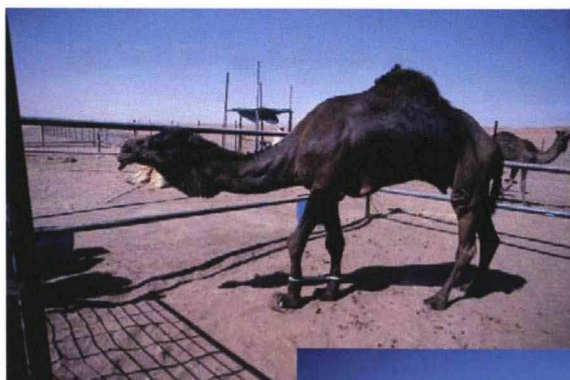
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**TRAINING AND DOCUMENTATION
ON CAMEL SCIENCES**

INTERNATIONAL CONSULTATION FAO

**AL-JOUF
(Saudi Arabia)**

4th to 17th May 2009



Bernard FAYE
CIRAD-ES

June 2009



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Rapport, June 2009, Montpellier (France)

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SUMMARY :

The Camel Center at Al-Jouf, based in the North of Saudi Arabia is focused on pastoralism, camel farming and breeding, and olive oil culture. The current mission was achieved in the frame of the project "Camel breeding, protection and improvement Centre in the Kingdom of Saudi Arabia" (UTFN/SAU/021/SAU). This ambitious project (4.6 millions USD), strongly supported by the national FAO office is focused in a first step on the capacity building of the researchers and technicians of Al-Jouf center in different fields: setting-up questionnaires for farming system analysis, achievement of experimental design and observational protocols in camel farms, documentation and scientific reports writing, data management and data treatment. During this first session, different aspects were approached:

- (i) methodology for observational procedure,
- (ii) participative building of a questionnaire for typological survey,
- (iii) critical analysis for the writing of a scientific paper,
- (iv) initiation to typological analysis,
- (v) initiation to multivariate analysis. Further training sessions would be necessary as well as a support for research activities by a powerful monitoring of the research protocols.

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1. RECALL ON THE TERM OF REFERENCES

Under the overall supervision of the Chief RNER and the FAO Program Coordinator in KSA, under the direct supervision of the CTA, under the technical supervision of the related technical division and in close collaboration with the National Project Director and project staff/counterparts, the consultant will be responsible for:

1. Prepare a program with a precise schedule for the training course covering documentation, preparation of research proposals, experimental design and scientific writing.
2. Review the camel herder survey and demonstrate the practical approach for collecting information from camel herders and specimens from camels for laboratory investigations.
3. Conduct the training course for 20 participants from the Centre and other Regional research centers for two weeks – starting 1st May to 15th May, 2009 using the facilities in the Camel and Range Research Centre.
4. Practical demonstration of the different programs used for data analysis.
5. Write a report on the training course and give conclusions.

2. PROPOSED PROGRAM FOR THE FIRST SESSION

Training course on camel farming survey: tools and methodology

Context:

The Camel Breeding, Protection and Improvement Centre in the Kingdom of Saudi Arabia – Camel and Range Research Centre - Project – UTF/SAU/021/SAU – at Aljouf – Sakaka – Unilateral Trust Fund – Run jointly by FAO and the Saudi Ministry of Agriculture (MoA) - will conduct a comprehensive survey in the different Regions of KSA.

Training programme:

First week

- | | |
|--------|--|
| Day 1. | Introduction to farming system concepts and analysis (3 hours)
Generalities on questionnaire conception and survey's procedure (3 hours) |
| Day 2. | Participative conception of a questionnaire (3 hours)
First introduction to multivariate data analysis (3 hours) |
| Day 3. | Visit of 3 to 5 camel farms/group to implement the questionnaires (3 or 4 groups of trainees) |
| Day 4. | Catching data in excel table and data control (2 hours)
First multivariate analysis (2 hours) and interpretation of the first typology of camel farms (2 hours) |
| Day 5. | Revising questionnaire according the first statistical results (2 hours)
Presentation of different types of camel farming typology (4 hours) |

Second week

- | | |
|----------|---|
| Day 6- 7 | Exercise on multivariate analysis on camel farms data; factorial analysis and hierarchical classification (12 hours): this part required available computers, one for 2 or 3 trainees maximum |
| Day 8. | Generalities on searching documentation and writing scientific papers (3 hours)
Participative conception and writing paper (3 hours) |

- Day 9. Powerpoint conception and oral presentation of the former typology results (3 hours)
- Day 10. Powerpoint presentation of each trainee to the others (4 hours)
General discussion and round table on the limit and interests of the camel farming analysis (2 hours)

Material required:

- One class room with video data show and whiteboard
- One computer room with at least one computer for 2 to 3 trainees
- One vehicle for field visit on day 3
- Excel software
- Internet access
- Printer for printing questionnaire

According to the delay to reach the Center (the visa acceptance arrived very late and the departure of the consultant was postponed on May 4th), the programme was modified to be reduced in 6 days. The main presentations were listed in annex of the present report.

3. CONTENT OF THE ACHIEVED TRAINING

Participants:

Dr Saied Kamal Salih, PhD bacteriology
Mr. Mustafa Ibrahim Zeidan, MSci, Virology
Mr. Falah Awad Alsharary, Animal production
Hussein Ridaa Abdallah, DVM
Ihab Abdel Karim, DVM
Osama Mahmoud Alhamna, DVM
Gamri Hashim Al Ramada, Bsc Bacteriology
Saad Falah Al Sharary, Vet assistant
Mumdouh Salih Al Shararay, Vet assistant
Abdel Gadir Musaad, Milk technician
Bunder Sami Alsharary, Vet assistant
Sagid Habid Al Rwaily, Animal technician
Fayez Sinian Alsharary, animal technician

• **Day 1.**

After the presentation of the new program (annex 2), a first *powerpoint* presentation has been showed on the observational procedure and widely comment on the basis of examples on survey in dry areas, notably in camel herds. The aim of the presentation was:

- (i) to expose the methodology for achieving to give some basic data on farming system analysis,
- (ii) a typology of the livestock system using 3 methods (segmentation, by expert knowledge, or by automatic classification),
- (iii) to propose the different steps of an observational study. This presentation was followed by the general information of the set-up of a questionnaire and of a field interview focused on health survey. According to the demand of the trainees, I presented also some data on the camel farming system through the world. At the beginning of the training, an exercise was proposed in order to prepare an experimental design.

- Exercise 1: a previous experiment comparing cow and camel face to a mineral supplementation with selenium has shown that camel did not response like cow with an increase of selenium concentration in serum 5-fold more important in camel than in cow. What kind of experiment could be achieved in order to answer to the research question “how to assess the sensitivity of camel to selenium supplementation in different physiological stages”? The trainees had to prepare some proposals for the day 2.

In addition of the training, data were collected from the current questionnaire on camel farming system (some of them were translated in English), in order to achieve a first typology with the trainees.

- **Day 2.**

For the second day of training, a participative approach was achieved in order to learn the methodology of preparation and writing a questionnaire. The aim of this day was for the trainees to appropriate themselves the questionnaire methodology to be applied to camel farmers. The objectives of the questionnaire were called: “to describe the camel farming systems in Al-Jouf area by considering the camel herd importance and composition, the health status of the camel herd, the main social and economic features of the camel farm, the breeding performances of camel, feeding system and a short breed description.

Those items were chosen by the group of trainees. In the morning, all the items were analyzed in term of type of data necessary to achieve the objectives of knowledge. It has been explained to not confound structural and functional analysis. So, all questions on farming practices were discarded in this preparation. The objective was to have a descriptive analysis of the farming system, not to analyze the functional activities. In the same way, the full description of the breed was discarded of this first questionnaire. A specific survey must be implemented for breed description, including a follow-up of different herds in order to assess the performances of the different breeds (setting up of a control performance). The mixing between the objectives must be avoided.

The participation of the group of trainees was really very active and all the participants were discussing including those having difficulties to understand English. In the afternoon, the questionnaire was written collectively according to the data retained in the morning. The final questionnaire was printed and given for all participants. It must be tested in farm at the day 3.

- **Day 3.**

The questionnaire was applied and tested in 2 camel farms closed to Al-Jouf Centre with all the trainees, Dr ABU-SAMRA and myself. After return to the Centre, the questionnaire was modified for to a better adequacy to the local knowledge and to the understanding by the farmers. The methodology for questionnaire application was discussed and a final version of the questionnaire was proposed.

This questionnaire aims to achieve a structural typology of the camel farms, not a functional one (no data on practices). In the afternoon, the group has started to learn the methodology for implementing an experimental procedure. As selenium deficiency has been revealed as one of the main health constraint in the area, it has been proposed to set up a trial on the selenium supplementation in she-camel. Based on literature results, the objective of the trial was to **assess the sensitivity of camel to selenium supplementation in different physiological stages.**

The different steps of the experimental procedure were described by a collective contribution. The objective could be to propose the true implementation of the proposed protocol discussed collectively with the participants (see annex 3).

- **Day 4.**

The writing of the experimental protocol was finished at the beginning of the session, and then an initiation to data analysis was proposed showing the different possibilities of data treatment and interpretation especially for survey's analysis. One example of data table from the current questionnaires was managed (codification, factorial analysis, automatic classification). It is obvious that this part was hardly understood by the trainees as their basic knowledge in statistics was very low. However, I did not insist on the mathematical aspect, but better on the use of the methods by empirical approach. A demonstration with XLstat was proposed.

- **Day 5.**

The training session was focused on the writing scientific paper. A PowerPoint was presented by using an example a recent published paper on camel milk. the trainees were asked to give their opinion at each step of the writing paper (which title? What must be the abstract content? What must be the main conclusion? The types of valorisation were listed also. This session was followed by the interrogation of library data base in order to identify the interesting literature linked to the protocols to be implemented. After this session, an example of survey on calf mortality and calf diarrhoea was presented by M. BENGLOUMI in interaction with me.

- **Day 6.**

The training was continued with the presentation of two morning sessions: one on camel semiology and a second on camel physiology linked to disease susceptibility. These sessions were presented by M. BENGLOUMI. In the afternoon, a powerpoint was presented on the mineral imbalances in camel by myself. Finally, a round table discussion was organized in order to propose some proposals for research protocols with a calendar and a responsible (as it has been done for the protocol on selenium (see annexes). In 2 weeks, each responsible have to send an email to me in order to give the state of the advancement of the work and a protocol within one month. The current proposals and responsible are as follows:

N°	Leader	Topic	Type of study
1	Osama Mahmoud Alhamna	Selenium/copper	Experiment on the effect of organic trace-element on status of lactating camel
2	Hussein Ridaa Abdallah	Survey	Organization of the large-scale survey on camel farming system, farming practices and breed description
3	Dr Saied Kamal Salih	Mastitis	Assessment of the interaction between subclinical mastitis (CMT, SCC) and pathogen germs in the camel milk
4	Ihab Abdel Karim	Trypanosoma	Survey on the incidence of clinical trypanosome in Al-Jouf region
5	Mr Mustafa Ibrahim Zeidan	Camel diarrhea	Survey on the risk factors of the newborn diarrhoea and identification of the main causal agents
6	Gamri Hashim Al Ramada	Brucellosis	Incidence survey on brucellosis in camel farms of Al-Jouf area
7	Abdel Gadir MUSAAD	Pasteurization and quality	Determination of the milk composition and heat resistance of some enzymes after pasteurization of the camel milk.

4. COMMENTS AND RECOMMENDATIONS

The group of trainees included scientists and technicians, i.e. people with high differences in academic and technical level. Some of them do not speak currently English and it was difficult for them to follow the lecturers. On average, the scientific level appeared very low and the lack of activities has limited their ability to think about the possibilities to achieve convenient and operational studies. They have never published any paper, they are not accustomed to read the scientific literature, they don't have convenient library in the camel centre (for example, no subscription at least for *Journal of Camel Research and Practice*). So, all these points contributed to the lack of initiatives. The head of the camel centre has to push them strongly, to set up a strategy for the capacity building (both by training and by recruitment with the support of the authorities) according to the guidelines proposed by the project. On average, their basic knowledge appeared not sufficient to boost the camel research quickly.

However, in spite of these observations, it can be underlined the very high participation of the trainees to the different sessions and their high motivation of the scientists. They asked many questions, participated warmly to the debates and were quite volunteers to go ahead. They really need to be guided strongly and to feel that they are supported by the authorities.

What are the needs for further trainings and/or supervision? I'd like to suggest 5 key points:

1. **To supervise the setting up of the observational surveys:** they learned at the present training some basic information about the methodology of observational procedure (survey's organization, questionnaire writing, methodology of interview), but they need now to achieve such surveys regularly in the field. It is important for the team of the centre, to go out of the camel experimental farm, in order to get the basic knowledge of the camel farming system in Saudi Arabia. The setting up of such observational survey must include the achievement of a large-scale survey as it has been proposed, the

general organization of the survey (training of the surveyors, self-appropriation of the questionnaire, collecting questionnaire, multidisciplinary working group creation, computerization of the collected data, returning results to the camel farmers);

2. To train on organizing database for data management and analysis: this part must include 2 aspects:

- (i) after identification of one or two motivated persons, to develop the capacity building in data management (training on Access software) in order to answer to all the questions about the data collection, survey or experiment,
- (ii) to train at least one person in the field of multivariate statistics (or to recruit a statistician), but also to continue the sensitization of the scientists to the statistical analysis in order to promote a better exchange between the data collection, data management, data treatment and interpretation. This sensitization could be assumed by a collective training.

3. To supervise experiment management: some experiments were proposed during the present training (see table above). However, a close follow-up is necessary for supervising these experiments. The management of experiments must include:

- (i) the conception and the implementation of the protocol decided after studying the convenient relative literature,
- (ii) the sampling techniques both for the choice of the animals and the sampling of material (as blood, milk, feeds and others),
- (iii) the follow-up of the experimental procedures (sampling calendar, conservation of the samples, storage of the data),
- (iv) the training of the technicians, the supervision of their work, their participation to meetings for explaining the objectives of the trial

4. To train on some lab techniques: According to the types of experiments or of the diseases survey, it would be necessary to train both the scientists and the technicians to the relative laboratory techniques corresponding to the demands in diagnosis (vet diagnosis), in product analysis (camel milk for example), in biological studies (blood parameters). The trainings must be specific and include the control of the apparatus used. It could be achieved by specific training internship in recognized labs in Saudi Arabia or in the region (for example, for bacteriological analysis, the CRVL of Dubai could be proposed). The recruitment of scientists with competencies in biochemistry, immunology, genomic or microbiology would be useful.

5. To supervise the valorization of results: It is an important point to encourage the staff for publishing their results, not only in scientific journals (at international or national level), but also for the beneficiaries, especially the farmers: handbook on camel diseases or on camel management, synthetic documents, illustrated reports, contribution to camelpedia (www.isocard.org). The valorization must include also potentially movies, multimedia tools and training modules for camel farmers and field technicians. The contribution to the vet or zootechnician trainees in Universities and colleges has to be supported also.

All these points have to be supported and controlled by the CTA of the camel centre.

ANNEXES

ANNEXE 1 - Calendar and official mets

ANNEXE 2 - Presentation of the training

**ANNEXE 3 - Protocol collectively proposed for implementing a
trial on selenium supplementation in camel**

ANNEXE 1

Calendar and official mets

Calendar and official mets

Monday 4th May

- Departure from Montpellier at 10:20
- Arrival at Riyad (Saudi Arabia) at 20:50
 - Transfer to hotel

Tuesday 5th May

- Interview with Dr Abdallah OIHABI, FAO program Coordinator in Saudi Arabia.
- Interview with Dr El-Mostafa DARFAOUI, Natural Resources Department, Ministry of Agriculture, Riyad, KSA
- Preparing the training mission
- Departure to Al-Jouf at 21:55
- Arrival at 23:25
 - Welcome by Dr ABU-SAMRA, CTA camel center and Dr SALLAL ESSA, National project director of the center

Wednesday 6th May

- Visit of the camel farm and interview with Dr ABU-SAMRA and Dr SALLAL ESSA, head of the Centre
- Visit of the camel centre and interviews with the different scientists
- Preparation of the conference room

Thursday/Friday 7-8th May

- Reading the report on camel center activities
- Preparation of the *powerpoints* for the training
- Interview with Pr. MEHRI (CTA olive center)

Saturday 9th May

- First training on the general program, the observational procedure and the questionnaire building
- Catching data from the previous survey in Excel table
- Discussion s with Dr ABU-SAMRA and SALLAL ESSA

Sunday 10th May

- Second day of training. Participative building of questionnaire in order to achieve a typological analysis of the camel farming system in The Al-Jouf area

Monday 11th May

- Visit field in two camel farms and testing questionnaire
- Critical analysis of the questionnaire and modification
- Training on experimental procedure

Tuesday 12th May

- Training on data analysis (initiation and demonstration)
- Interview with M. BENGOUNI (FAO regional) and A. OHAIDI (FAO national coordinator)

Wednesday 13th May

- Training on writing scientific paper. Presentation of ecopathological survey on camel calf mortality in Morocco

Thursday 14th May

- Training on the Semiology of camel and on the physiological particularities of the camel (M. BENGOUNI). Training on the mineral imbalances in camel (B. FAYE)
- Interview with Dr SALLAL ESSA
- Departure to Riyadh at 00: 55

Friday 15th May

- Arrival at 2:30
- Discussion with M. Bengoumi
- Writing report

Saturday 16th May

- Restitution to FAO office
- Interview with J.M. AL-SHEHRI, Deputy-Minister, Ministry of Agriculture
- Finalization of the report
- Departure for Montpellier

Sunday 17th May

- Arrival in Montpellier

ANNEXE 2

Presentation of the training

3. Presentation of the training

Training course on camel farming survey: tools and methodology

Bernard FAYE

Programme

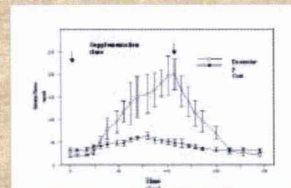
- DAY 1**
- Introduction to farming system concepts and analysis
 - Presentation of different types of camel farming typology
 - Generalities on questionnaire conception and survey's procedure
- DAY 2**
- Participative conception of a questionnaire
 - Critical analysis of the existing questionnaire
 - Observational and experimental procedure
- DAY 3**
- First introduction to multivariate data analysis
 - Visit of 3 to 5 camel farms/group to implement the questionnaires (3 or 4 groups of trainees)
- DAY 4**
- Catching data in excel table and data control
 - First multivariate analysis and interpretation of the first typology of camel farms
 - Revisiting questionnaire according the first statistical results
- DAY 5**
- Generalities on searching documentation and writing scientific papers
 - Participative conception and writing paper
 - Powerpoint conception and oral presentation of the former typology results
- DAY 6**
- Powerpoint presentation of each trainee to the others
 - General discussion and round table on the limit and interests of the camel farming analysis

Objectives

- To understand the methodology of observational procedure (survey)
- To understand the methodology of experimental procedure (trial)
- To conceive a convenient questionnaire
- To achieve a farm typology
- To be initiated to multivariate analysis
- To be ready for publishing scientific paper

Please, prepare experimental design for day 2

- Object: selenium metabolism in camel
- Background:



- Hypothesis: the camel is very sensitive to the selenium supplementation
- Objective of the trial: to assess the sensitivity of camel to selenium supplementation in different physiological stages

ANNEXE 3

**Protocol collectively proposed for implementing a trial
on selenium supplementation in camel**

3. Protocol for implementing a trial on selenium supplementation in camel

Protocol on study of selenium metabolism in the Arabian camel

Al-Jouf on May 11th 2009

Background:

The camel seems to be more than sensitive than cow to some mineral supplementation especially Se (Bengoumi et al., 1998). Recent studies has confirmed the positive effect of mineral supplementation on Se status both in non-lactating (Seboussi et al., 2008) and lactating camel (Seboussi at al., 2009). But the use of organic Se supplementation and other organic trace element compounds was never studied in camel.

Hypothesis:

The camel is very sensitive to the trace element supplementation

Objective of the trial:

To assess the sensitivity of camel to trace element supplementation in different physiological stages

Material and methods:

1. Camels

21 adult she-camels at similar age and pregnancy stage at the beginning of the trial, shared into 3 groups:

	Pregnant	Lactating	New born
Control	7	7	7
Treated org TE	7	7	7

Animals should be dewormed and sprayed and in good health, receiving good fodders and water ad lib. All the camels will belong to Al-Majaheem breed.

2. Duration

9 months (3 months pregnancy and 6 months lactation)

3. Treatment:

Control: none

Treated Se: sélénométhionine¹ + Cu, Zn organic

¹ *Sel-Plex (Sacharomyces cervisiae CNCMI-3050): the basal diet must be supplemented with 0.3 mg/kg Se from Sel-Plex Se yeast (Alltech) - ARASCO Head Office*

Contact Telephone (966) 1 419 1933; Fax (966) 1 419 1520

Location: Office 625 at Akaria Center # 2

Olaya Street, Riyadh Location map Postal Address: PO Box 53845, Riyadh 11593 Saudi Arabia

4. **Feeding three times a day:** Hay (3 kg) + Alfalfa (5 kg) + barley (3 kg)
 - a. Weighing the feeds before distribution per group
 - b. Weighing the refusals
5. **Sampling:**
 - a. Sampling of food from each batch arriving
 - b. Sampling of mother blood: every 2 wks (18 samples)
 - c. Sampling of new born blood: from 0 (before colostrum) then each wk for the first month (4 samples) and every 2 wks thereafter (10 samples)
 - d. Sampling of milk: first day (colostrum), then as for newborn blood sampling
6. **Laboratory analysis**
 - a. Se, Cu and Zn in food, in plasma and in milk
 - b. Dry matter and ash in food
 - c. Glutathion-peroxidase (Gsh-Px) in red blood cells
 - d. Zinc-dismutase and ceruloplasmin
7. **Data analysis**

Variance analysis on repeated measures
Correlation between parameters using Pearson coefficient
8. **Responsible**

Oussama Athmanah
with the assistance of Abdu Kader

References:

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