

Dairy Delegation Tour of Australia

June 7th to June 21st 2008

Participants:

Australia

Dr Peter Wynn – Professor of Animal Production, CSU Wagga Wagga
Dr Russell Bush – Lecturer in Animal Science, University of Sydney
Mr David McGill – Project Manager ASLP Dairy Project, CSU Wagga Wagga

Pakistan

Dr Muhammad Afzal – CEO, Livestock and Dairy Development Board
Dr Rafiq Usmani – Animal Husbandry Commissioner, MINFAL
Dr Irfan Zahid – DG Extension, Livestock and Dairy Development Department
Dr Sajjad Khan – Chairman of Breeding and Genetics, Uni of Agriculture, Faisalabad
Dr Javed Iqbal – Director Sahiwal Conservation Project, L&DDDept. Jhang

Saturday June 7th

Arrived at Brisbane Airport

Sunday June 8th

The delegation travelled from Brisbane to Cairns. The group met with Tom Cowan, former Professor of Dairy Science at the University of Queensland who has had extensive previous experience in the sub-tropical and tropical dairy industries of Queensland.

Monday June 9th

The team travelled by bus from Cairns to Malanda where we picked up Howard Smith who is a local extension provider with the Dairy Farmers Co-operative. Howard accompanied us to the first dairy farm at Innott Hot Springs.



Photo: Dairy Delegation at Springs Dairy

Farm Visit:

Reynolds and Tranter Families
Springs Dairy, Herbert River Road, Innott Hot Springs 4872.

Springs Dairy is Queensland's largest dairy farm with approximately 1200 cows fed in a semi-feedlot system in a dry environment with good access to irrigation water. This farm is owned by two separate families who had previously each run their own farm.

Lessons learnt from Springs Dairy:

- Fodder conservation techniques
- Benefits of co-operatives/joint ventures
- Simple shed design

Contact:

John Lindsay DPI&F (07) 4091 9410, john.lindsay@dpi.qld.gov.au

Farm Visit:

Glen Drury's Farm
Malanda, 4883

Glen's enterprise has been given approval to be marketed at bio-dynamic which allows him to obtain higher prices in line with those received by organic milk producers. In order to get this approval Glen had to adhere to many restrictions in terms of use of fertilizers, pest and parasite control as well as health treatments and preventatives for his dairy animals.

Lessons learnt from Glen Drury's Farm:

- Minimum inputs which lead to lower outputs but an increased potential for profit from the production system
- Alternate forms of health management such as breeding for resistance can be a useful tool in controlling problems. Glen was very confident that his breeding strategy was helping to greatly reduce his mastitis problems.
- There are many different methods of controlling pests. Fore example Glen had a buffalo fly trap which used natural light to trap the insects.

Tuesday June 10th

Institute Visit:

Walkamin Research Station
(DPI&F), Kennedy Highway,
Walkamin 4872.
www.dpi.qld.gov.au

Contact:

Kendrick Cox – (07) 4092 9924,
kendrick.cox@dpi.qld.gov.au

The Walkamin Research Station is mainly concerned with the development of seed and pasture varieties for the dairy industry. They also work on agronomic



Photo: Kendrick Cox talking with Dr Sajjad, Dr Afzal and Tom Cowan, Walkamin Research Station.

problems for the seed industry. The department has had experience with similar development projects in Vietnam. They found that in the cut and carry systems the best varieties are those that can be vegetatively propagated. This will then make the purchase of seed unnecessary which is of great importance to small holder farmers. Kendrick suggested that the following varieties might be useful in the Pakistani systems:

- Guinea's
- Setaria
- *Andropogum gayas* (Gumba grass) – this is a weed in Australia but can be good if it is controlled which would be the case with cut and carry
- Dwarf elephant grass (*pannisetum*): not Mott grass but similar
- *Stylo sp.*
- Lab lab
- *Lucaena sp.*

Lessons learnt from Walkamin Research Station:

- There are many other varieties of species available that are already being used that may be more beneficial to farmers in terms of biomass and sustainability
- There are a number of species currently not used as forages in Pakistan that could be useful
- The “Tropical Forages Database” www.tropicalforages.info and “AusPGRIS” site are both easily accessible websites that contain valuable fodder/forage and species/varieties information relevant to the Pakistani dairy system.

Seed Company Visit:

Southedge Seeds Pty. Ltd, Australian Pasture Professionals.
24 Tinaroo Creek Rd, PO Box 1502 Mareeba QLD, 4880.
www.southedgeseeds.com

Contact:

Ross Newman – Marketing Manager
Ph#: (07) 4086 2400
Mob#: 0407 113 719
ross@southedgeseeds.com.au

Ross Newman showed us around his display plants, especially a few species which would be suited to the dry and alkaline soil conditions that are found in the Punjab of Pakistan. He also told us about an innovation developed at Southedge seeds where the seed is cleaned and coated which helps with germination, dispersal of seed and removal of trash (see picture).



Photo: Seeds prior to cleaning, after cleaning and after coating at Southedge Seeds

Possibilities with Southedge Seeds:

- Utilising their products in Pakistan. They are already exporting to other countries and are willing to co-operate with Pakistani organisations as well. It is just a matter of finding a market in which producers are willing to pay the appropriate price for their product.
- Promoting mixtures of seed similar to that used by Southedge Seeds: the company has values available on biomass of mixtures and nutrients that can be provided from these mixtures.

Wednesday June 11th

The team travelled in the morning to Brisbane to meet with Peter Wynn and then travel onto Toowoomba to visit Mutdapilly Research Station.

Institute Visit:

Mutdapilly Research Station

Contact:

Kevin Lowe

Principal Extension Officer - Feeding Systems

Ph#: (07) 5464 8713

Mob#: 0409 021 225

Kevin.Lowe@dpi.qld.gov.au

The research station focused on dairy production from grazing of tropical pastures and then the conservation of excess as silage. Thus in many respects the system was not suitable for adoption in Pakistan.

Of direct interest to the visiting delegation was the insight provided by staff, into the extension services provided to dairy farmers by the Queensland DPI, both past and present. The delegation learnt that the most effective form of extension involved one-on-one interaction. However where this is not possible, the preferred method of extension is the formation of producer groups where farmers learn from each other. The extension officer acts as a facilitator to assess and address the needs of the group, bringing in outside expertise when required.

Thursday June 12th

Farm Visit:

Stan Hughes Farm

120 Boodua West Road, Boodua 4401

Ph#: (07) 4696 7613

Stan owns a dairy herd fed in a feedlot system with grazing herds. The system is mainly forage based with approximately 200 animals producing 7000L/cow.

The important points learned from this farm were:

- Focus on feeding animals rather than on expensive infrastructure
- Design the farm to minimise labour inputs.
- Carefully manage the conservation of forage through use of silage. Bun silage has proved to be cost effective if used carefully and compaction is sufficient to minimise waste.
- Target infrastructure expenditure towards priorities such as new facilities for feeding and rearing calves.

Seed Company Visit:

Pacific Seeds

268 Anzac Avenue, Toowoomba 4350

www.pacificseeds.com

Contact:

Nick Gardner

Regional Business Manager – West Asia and Africa

Mob#: + 61 418 795 866

nick.gardner@advantaseeds.com

www.advantaseedint.com

Ken Reimers

Crop Business Manager – Forage & Oats

Ph#: (07) 4690 2624

Mob#: 0428 718 810

ken.reimers@pacseeds.com.au

Pacific Seeds was a good place to visit as it is obvious that they are a company who have a lot of international experience and exposure. They have also had experience in Pakistan and they highlighted problems with the marketing of their product which is generally too expensive relative to local seeds for the average small farmer.

We learnt of many different varieties available from Pacific Seeds. From the presentation it was found that the most suitable varieties for the Punjab areas of Pakistan are:

- Sugargraze – which is a fool proof fodder which is the best variety available for silage.
- Pacific BMR – which had 4 cuts per year and a high biomass

Comparison of Various Crops as Silage

	Energy MJ/kg	Protein %	NDF %	ADF %	Digestibility %	Yield t/ha DM
Corn - 2.5 milkline	10.6	8.1	45	24	70	18.5
Chopper - milky dough	9.7	8.3	44	29	66	16.4 (8.7 2nd)
Sugargraze - soft dough	8.8	6	56	37	58	27
Pacific BMR - Vegetative (1-1.2 m high)	8.2	15.1	61	38	59	16.1 (4 cuts)
Wheat - soft dough	8.9	8.1	58	38	59	10
Alfalfa - early flower	9.1	17		37	60	2.4

Possibilities with Pacific Seeds:

- Pacific Seeds are already in Pakistan and the international market so it will be worthwhile to see what they are trialling in Pakistan and maybe diversify the trial sites to include some livestock farms through Dr Javed or Dr Irfan
- Discuss with Steven Lees what trials are in progress with PDDC and Pacific Seeds.

Institute Visit:

University of Queensland, Gatton Campus, Animal Sciences Department

Contact:

Wayne Bryden – Professor of Animal Sciences

School of Animal Studies

The University of Queensland Gatton Campus

Gatton QLD 4343

Ph#: +61 7 5460 1250

Mob#: 0413 808 830

w.bryden@uq.edu.au

This visit was a good visit for the Pakistani's in terms of contacts, not only with some Australian scientists but also with some Pakistani students who are in Australia studying.

Outcomes of visit to the University of Queensland:

- Contact with University academics
- Contact with Pakistani students studying in Australia

After our visit to the University Tom Cowan left the group. It was very good having a person with local knowledge of the areas we were visiting as it facilitated knowledge acquisition for our visitors.

Friday June 13th

Seed Company Visit:

Blue Ribbon Seed & Pulse Exporters (Australian Premium Seeds Pty. Ltd.)
PO Box 1146 Kenmore Queensland 4069

Contact:

James Hunt

Ph#: (07) 3720 1900

james@blueribbonseeds.com.au

Stephen Donnelly

Ph#: (07) 3720 7380

stephen@blueribbonseeds.com.au

Ross Bruggemann – National Sales Manager

PO Box 96 Carole Park Queensland 4300

Ph#: (07) 3879 3350

Mob#: 0427 466 955

apseeds@bigpond.net.au

Aslam

Jalinda Private Ltd.

Karachi

Blue Ribbon seeds has had recent experience in Pakistan and are working with the ASLP Austrade group. Blue Ribbon are currently testing a number of species and varieties through Jalinda Private Ltd. Reports of this work have shown that un-productive saline land had been converted into land capable of producing fodder using a salt tolerant Rhodes grass variety. They are also trialling:

- Maxa millet which shows some promise
- Forage Sorghum varieties
- Lab lab, Leucaena and Stylo's which have all been previously suggested as being suitable to the Pakistani environment by a number of persons during the tour.

Blue Ribbon seeds also have their own seed coating specific for Pakistan which retains seed viability under the flood irrigation systems in use.

Possibilities with Blue Ribbon Seeds:

- Trials on different livestock farms in Pakistan. Follow this up with Dr Irfan: he suggested that we run these trials.
- Link up Blue Ribbon seeds with Dr Sartaj's national program as they are not familiar with it. It may help in getting their products listed.
- Contact with their collaboration company in Pakistan to aid in obtaining seed for trials.
- Trial fodder plots at farm sites to show farmers in our project the possibilities that can be reached with improved fodder varieties.

Institute Visit:

The Commonwealth Scientific and Industrial Research Organisation (CSIRO)
306 Carmody Rd, St Lucia Brisbane.

Contact:

Cam McDonald

cam.macdonald@csiro.au

Cam McDonald spoke to us at length about his model and how he is trying to adapt it to the Pakistani dairy system. This was well received by the Pakistani's and they agreed that it would be a helpful tool in explaining some of the fundamental messages we are trying to convey.

Outcomes of the visit to CSIRO:

- Contact with numerous scientists
- A good overview of Cam's Pakistan Dairy model

Company Visit:

Australian Rural Exporters (AUSTREX)

Contact:

Richard Trivett and Justin Slaughter.

We had a brief visit and discussion with the people from AUSTREX about the importation of dairy cattle from Australia to Pakistan. AUSTREX are now looking at the next shipment of animals and taking into account the lessons learned from previous shipments.

Outcomes of meeting with AUSTREX:

- Good overview of shipments from the points of view of the Pakistani's and AUSTREX
- Contact with Richard and Dr Usmani who (as the Animal Husbandry Commissioner) is responsible for all imports of animals into Pakistan

Saturday June 14th - Travel to Sydney for a day off.

Sunday June 15th - Rest day in Sydney and travelled to Wagga Wagga.

Monday June 16th

Institute Visit:

Charles Sturt University, Wagga Wagga

The E H Graham Centre for Agricultural Innovation

Contact:

Peter Wynn

Professor of Animal Production

pwynn@csu.edu.au

Kym Abbott

Head of School of Animal and Veterinary Sciences

kabbott@csu.edu.au

Deirdre Lemerle

Director, Graham Institute

dlemerle@csu.edu.au

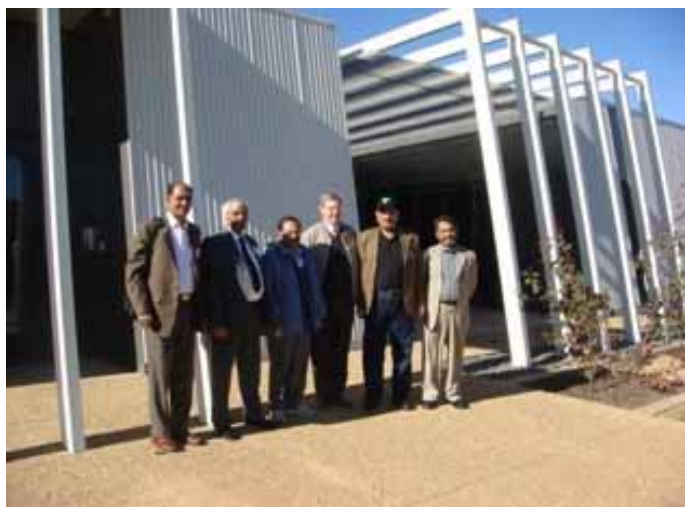


Photo: Pakistan Dairy Delegation with Kym Abbott. School of Animal and Veterinary Sciences CSU, Wagga Wagga

We toured the School of Animal and Veterinary Sciences and were able to see the new facilities that have been built for veterinary training as well as meet many of the staff. We also visited the people and sites affiliated with the Graham Centre which provides a link for collaboration between CSU and the NSW Department of Primary Industries. This was very helpful in terms of creating more links with the prospect of getting more students involved. Furthermore it was a good experience in terms of technical knowledge as John Wilkins had conducted similar work to our project in Tibet and his team are also very involved in silage production and training on this subject.

Outcomes of visit to CSU and the Graham Centre:

- Many contacts and consolidation of already formed linkages
- Knowledge of past experience in overseas projects (Tibet)
- Good overview and technical information of silage and hay making
- Possibility of getting more students involved through the Graham Centre

Tuesday June 17th

Farm Visit:

Lloyd Chesworth's Farm at Finely

Lloyd Chesworth runs his farm with his wife, son and daughter in law. Although this is a typical farm for the region it is highly mechanised with many computer systems aiding in decision making and monitoring of the farm. On this farm calves were taken away from their mothers as soon as possible and the mothers are milked to obtain the colostrum. The colostrum is then fed back to calves to ensure they get an adequate amount in the first few hours. The calves are then left on an automatic feeder until 8-10 weeks of age.



Photo: Dairy Delegation and Peter Wynn with Lloyd Chesworth at his farm in Finely

Despite the many interesting things that Lloyd carried out on his farm, he was very positive about the use of extension services in the area over the last 20 years. Lloyd feels that farmer discussion groups where farmers teach farmers is a very effective method of extension.

Lessons learned from Lloyd Chesworth's farm:

- The importance of feeding colostrum to calves and one way to do this
- The benefit of farmer discussion groups and specific extension providers

Institute Visit:

Kyabram Dairy Research Centre
www.dpi.vic.gov.au

Contact:

Bill Wales – Principal Research Scientist
120 Cooma Rd Kyabram Victoria 3620
bill.wales@dpi.vic.gov.au

John Moran – Senior Dairy Advisor
120 Cooma Rd Kyabram Victoria 3620
john.moran@dpi.vic.gov.au

At Kyabram we spoke to a few different experts about irrigated lucerne trials and dairying in the area. The most important issue confronting farmers was the lack of water for irrigation resulting in a shift from feeding systems based on irrigated pastures and fodder crops. John Moran, who has had previous experience in Pakistan, also discussed his experiences. His main points were to not focus on improving the genetics of the national herd but feed the current cows and calves better first.

Lessons learned from Kyabram Dairy Research Centre:

- Fodder should be treated as a crop and not as anything less
- Our perceptions of ways to improve the Pakistani dairy system are the same as senior advisors from the Australian Dairy Industry

Wednesday June 18th**Farm Visit**

Rob Read's Farm Kyabram

This farm had an extensive variety of feeds given to the animals in a total mixed ration. Ingredients such as orange pulp and chocolate malt (both by-products of different industries) were being mixed in with silage and concentrate and fed on the feed pad.

Lessons learned from Rob Read's farm:

- The utilisation of by-products from the food industry can be a good and cheap way of adding protein/energy to a mixed ration

Factory Visit

Tatura Milk Industries Ltd
236 Hogan Street Tatura, VIC, 3616
www.tatmilk.com.au

We toured the milk factory which was a good change for the group. It was interesting to review the various ways in which they were processing the milk. It was also important to observe a factory in which hygiene and safety were of the utmost importance. We learned of the many ways in which Tatura milk was value adding to their products which ranged from the cheese and milk production to baby formulae.

Lessons learned from Tatura Milk Industries:

- There is more scope for value addition of milk products in Pakistan

Thursday June 19th

Institute Visit

Genetics Australia Co-operative Ltd.
PO Box 195 Bacchus March 3340, Australia
Ph#: (03) 5367 3888
www.genaust.com.au

Contact:

Peter Thurn – Breeding and Genetics Manager
Mob#: 0417 575 986
pthurn@genaust.com.au

Genetics Australia is a farmer owned co-operative where farmers have to pay a \$35 membership fee which provides them with shares in the company, discounted product and a vote on the decisions being made on the direction that the company takes. The core business of Genetics Australia is producing superior and profitable bulls for the farmer members of the co-operative.

Lessons learnt from Genetics Australia:

- Farmer co-operatives are a good idea for improvement schemes
- The importance of assuring farmers that they are part owners of the co-operative with votes and shares (not just members)
- The idea of rotational cross breeding

Institute Visit:

Australian Animal Health Laboratories
Geelong, VIC
www.csiro.au/places/aahl.html

Contact:
Martyn Jeggo – Director
Martyn.Jeggo@csiro.au

Visiting AAHL provided an excellent opportunity for the group to appreciate one of the worlds most advanced diagnostic laboratories. As most of the Pakistanis in the group were veterinarians and interested in diagnosis and treatment of disease it was of great interest to them.

This visit reinforced some of the conclusions reached by Richard Bevan on his recent trip to Pakistan to review vaccine production and diagnosis. Dr Jeggo also emphasized the roles of the institute in helping other countries in developing laboratories and improving diagnosis. He extended an invitation to the tour group to contact him if they wanted any formal connection or help with problems in Pakistan.

Outcomes from the visit to AAHL:

- Contact with personnel from a state of the art facility
- An invitation for collaboration with the director
- A good overview of the expertise, design and money required to build such a high standard facility
- An overview of some of the methods used in disease outbreak and diagnosis problems faced in Australia.

Friday June 20th

Institute Visit

Dairy Innovation and CSIRO's Food Science Australia

www.dairyinnovation.com.au

www.foodscience.csiro.au

Contact:

Lesley Macleod

CEO, Dairy Innovation

lmacleod@dairyinnovation.com.au

Lloyd Higginbotham

Director, FoodTech Program

Lloyd.Higginbotham@csiro.au

Visiting these two institutes provided good opportunity for meeting numerous scientists who are working in the industry in different roles. A lot of Dairy Innovations work is centred around planning for the future of the dairy industry which is essentially the aim of government endeavours in Pakistan.

Outcomes from the visit to Dairy Innovation and Food Science Australia

- Contact with a number of scientists

Summary

Overall this was a diverse and profitable trip with all members obtaining plenty of information and knowledge to help with the task of improving the dairy industry of Pakistan. Contacts were made all over Australia with seed companies, scientists and industry personnel which will aid in the development and progression of the ASLP Dairy project. Some of the most important lessons learned were the benefit of farmer groups, the importance of farmer co-operatives and the idea of treating fodder plants as a crop. Credit must go to all those who helped organise this trip and all the people that we visited around Australia for their time and effort.



Photo: The Dairy Delegation Tour Group: Russell Bush, Javed Iqbal, Irfan Zahid, Peter Wynn, Muhammad Afzal, Rafique Usmani, Sajjad Khan, Tom Cowan (Photo taken by David McGill)

Appendix A

Potential Follow-Ups

A list of the potential follow-ups from the Pakistani Delegation trip to Australia. The ASLP Dairy project can work on during these during the course of the project.

1. Follow up with Blue Ribbon Seeds/Pacific Seeds for contributions for future fodder plots. The use of certified, high quality seed from a good source is a good message to pass onto farmers.
2. Farmer groups/discussion groups are a good idea. Start implementing these with extension material thus combining current farmer problems whilst also trying cover the modules of the project.
3. Development of silage systems for dairy farming in Pakistan. Discuss with John Piltz the timing for a visit to Pakistan with him. Also start to plan for a 2nd group of Pakistani's to travel to Australia. The focus of this 2nd delegation will be nutrition and silage training that will be brought straight back to Pakistan.
4. There is a need for the introduction of teat sprays for mastitis control. Teat dips are currently used, but sprays can be just as cheap and more sanitary. Perhaps this is something that Chris Petzel can work on when in country; we could introduce it in his trip through the field.
5. There is a need to design and establish a calf rearing project based on demonstration of need for colostrum and concentrates.
6. Establish a student exchange program with Pakistani and CSU undergraduate students. We already have students interested in this.
7. Need to confirm with Martin Jeggo (AAHL) his desire to assist developing countries. Discuss this with Dr Afzal and Dr Usmani in Pakistan when we are following up the vaccine review report. It is then up to the Pakistani's to follow it up and ask for AAHL's help.

Appendix B

DAIRY DELEGATION VISIT TO AUSTRALIA Observations and Lessons Learnt

Dr. M. Afzal
Livestock and Dairy Development Board
Islamabad

Dairy Farms

1. Pasture is grown as crop with proper seed rate, irrigation and fertilization
2. One dairy cow per acre/hectare
3. Farm supplies provided by the farmers cooperative was not a good experience
4. Milk equipment provided on 20% subsidy by the dairy company
5. Farmers own artificial insemination cooperative
6. Government used to provide AI service (as recently as 1995) but now farmers do their own AI after getting training from the recognized institutes. According to one farmer AI is practice + hygiene.
7. At one place there were 2500 members of dairy cooperative
8. 50 % of farmers do AI, others use natural breeding
9. Dairy farming is usually a family business with a few hired hands
10. Some families are now joining together for dairy farming. So 2 to 3 families can combine their animals, labour and facilities for a larger unit
11. Normally there are 100 cows per labour unit
12. Farmers feel getting enough capital is an issue in dairy farming
13. No manure composting was done
14. Concentrate was mixed with silage or hay and fed to the animals. Ration (concentrate) composition varies based upon total day TMR concept.
15. During milking, different practices were followed including no feeding, concentrate feeding or only molasses lick
16. Farmers observe reproductive difficulties in summer
17. Breeding is planned by the farmers. A few use once a year breeding, many twice a year and others 3 times a year. No synchronization is done but animals coming in heat naturally are bred.
18. First preference is use of AI. Two attempts are normally done. If no pregnancy is achieved, then natural breeding is done.
19. In hot summer, farmers use sprinklers to the animals cool.
20. Heat detection is normally done in the proposed breeding season with use of oestrus patch. Morning and evening visual heat detection with heat detection patch is used. Some cows hold milking in let down (Doke).
21. Never ASSUME anything at the farm. It makes an ASS out of U and ME.
22. Most of the farmers were feeding whole fresh milk to calves (approx 4 litres a day). Milk from animals given antibiotic (mastitis or others) is used for calf feeding.
23. Milk collection from the farm is charged @ 15 Aus\$ per trip.
24. Some farmers (20-30%) give acid salts (anion exchangers) during last trimesters to mobilize calcium and avoid milk fever.
25. Identification tags on both ears. Electronic as well as fly repellent tag were also present in most of the cases.

26. Marketing of dairy male calves is an issue at many places
27. All farmers raise their own replacement heifers
28. Replacement heifer raising management generally included 4(2+2) litres of milk daily for first 8 weeks, crushed grain mixture or feed from one to two week onward, good quality hay (even rice husk+hay) from 2 weeks onward up to 8 weeks, ad lib concentrate feeding then with access to good pasture until 150 kg weight, then access to pasture, silage and 2 kg concentrate until weight reaches 350 kg of heifer.
29. Deworming and tick control are needed in calf raising
30. Organic farming paying dividend when price was 1.5 times that of normal milk.
31. Certification for organic farming requires 3 years, no concentrate feeding (other than organically grown items) is allowed and only herbal or homeopathic medicines are allowed. Biodynamics was the company buying organic milk.
32. Organic dairy farmer was feeding yougurt to its calves for 10 to 12 weeks after the first week.
33. Organic dairy farmer was having a mixture of Jersey, Holstein and Aussie Red animals.
34. The fat in milk of Holstein Frisian animals ranged from 4 to 4.5 %.
35. Payment of milk is based on protein (2/3) and fat (1/3).
36. Drought caused reproductive problems in cows.
37. Preferably 60 days dry period should be given to have better colostrums and lactation.
38. While making silage everybody uses inoculants (cost 1.5 \$ per ton)
39. One of the farmers commented "We cannot get enough advice for forage and nutrition"
40. High cull rate is the reason for success. If an animal develops mastitis twice, it is culled, if not pregnant in 2 AI attempts, it is culled.
41. Successful farmers discussion group (max 12-15 people) sharing their knowledge and annual farm accounts with each other and meeting regularly every month is key to extension and success.

Research and Development Institutes

1. 26000 accessions of grasses and legumes (the oldest collection from around the world)
2. Hybrid seeds are becoming popular due to their yield potential
3. Vegetative propagation of some forages is also possible
4. Foundation or basic seed given to commercial companies
5. Commercial dairy unit at the research station running like a commercial unit.
6. AI success in summer is lesser (about 30-33% on first service) than in winter (around 70%).
7. For first time breeding usually semen from lighter weight (even beef for Japan export) breeds are used by many farmers.
8. White skin animals get more skin and eye cancer.
9. In wet season, somatic cell count in milk is higher.
10. By-pass protein is important in animals with >30 litres/day milk yield.
11. Government extension service over the years is reducing in numbers.

12. Extension worker should be technically capable and have gone through specialized extension training.
13. There is a separate veterinary service department mainly concerned with infectious diseases and public health issues.
14. Farmers are given only 3 day training for AI. Training is then pursued by dairy advisors. Farmers do not do pregnancy diagnosis.
15. Research now focusing whole farming system approach
16. Informal discussion groups (6-8 persons) was the best method of extension.
17. The target for forage research is getting 50 tons dry matter per hectare. Currently 20 tons is being obtained.
18. Round bale silage (haylage) was being used.
19. In sorghum silage, the grains are not digested. Thus lab and in vivo findings are different.
20. Silage is made on the hard soil without any concrete walls/floor, etc. It is called Bun or Rainbow silage. The losses are similar to one done in concrete pits.
21. CSIRO is a high tech research organization of commonwealth government. Australia's national science agency with 27 Divisions and approximately 7000 full time scientists. Undertakes Blue Sky research.
22. One division in CSIRO is Livestock Industries. It has 80 million Aus \$ annual budget with 440 scientists and 5 sites. Mission is Diagnosis, Surveillance and Response; Transforming animal biosecurity and Transforming the Animal and its products.
23. APSIM is agriculture production simulation model. Peter Carberry of CSIRO is the relevant person.
24. "Impact" is a resource management model at the farm level.
25. Government matching grant to industry for research through Rural Development Centres (RDC).
26. Kangaroo is a low methane producer, thus it could provide solution to high green house gasses produced by the ruminants (sheep 20-40 l/day; cattle 200-350 l/day, dairy cattle 50 % more than beef).
27. Inoculants used for silage making are *Lactobacillus planetarium* and *Lactobacillus buchnari*.
28. Legume silage is also made. The dry matter should be 35 to 40 %. After cutting, wilting can be done to reduce moisture contents.
29. Teat spray consists of lanolin (16 g/l), glycerol (46 g/l) and Iodine (20 g/l).
30. Dairy Innovation Australia (1.5 years old) is not for profit, limited guaranteed company getting its funding from levy and membership fees. It is innovative catalyst with mandate for precompetitive research and industry focused delivery and communication mechanisms and also have fee for service delivery.
31. Dairy Innovation Australia has a culture division (starter and adjunct culture) which caters for industry needs on cost basis.
32. Hygienic production environment in the industry has reduced the phage contamination in the product preparation.
33. There are high affinity antibodies in the camel.
34. For developing FMD control strategy, Pakistan should approach OIE, FAO and SEAFMD program.

35. Every diagnostic lab should have a list of diseases, these are capable of diagnosing along with diagnostic tests or plan of processing of sample for each disease.
36. Diagnostic labs in Pakistan should become part of international quality assurance program (proficiency testing) being run by many countries. Australia has one.
37. Provincial or national lab should be able to produce diagnostic reagents and able to supply to district labs for effective running.
38. AAHL is working with a private sector company to produce transgenic chicken resistant to avian influenza.
39. NIPAH virus outbreak has been reported in Bangladesh where human to human transmission has been recorded also.
40. Bovigam is a tuberculosis diagnostic test for cattle available through Prionics.
41. Food Science Australia is an integrated centre of excellence in food science and technology R & D. It is a business unit within CSIRO with joint venture with Victorian State Government.
42. The easiest cooling method is to hose down the cow for several minutes.
43. Provide open space having water trough and feeding forages to the cow during evening and night (5 to 10 sq.m/cow).
44. Have a specific milking area in the shed. It is easy to clean.
45. Offer most of the daily forages during cooler periods of day and night.
46. Feed smaller amount of forages more frequently.
47. Offer cooler drinking water.
48. Cows should preferably stand for at least 30 minutes after milking so that teat end can close to protect the teat canal from bacterial invasion.
49. All cows in Pakistan must be provided with shelter in summer.
50. Natural ventilation of sheds by having open sides and high well pitched roofs should be preferred.
51. Free access to water is essential.
52. Fans and sprinklers will be beneficial to cow during extremes of summer.
53. Only in locations where minimum temperature falls below 5°C will protection from winter winds improve milking buffalo comfort and hence performance.

Universities

1. University of Queensland (Gatton Campus) is building new vet lab at the cost of Aus \$ 33 millions.
2. Livestock production degrees are given as such or as part of agriculture degree.
3. Charles Sturt University has recently started a veterinary degree program. There is lot of scope of cooperation with Pakistani universities.
4. There is annual conference of Deans of veterinary sciences in Australia. Pakistan should try to send our deans into this meeting.
5. A lot of audio-visual aids and models for veterinary education were present. We should try getting these.
6. An acting based communication course teaches students how to interact with owners and different aspects of veterinary practice. This should be a good addition to our curriculum.

Dairy, Genetic Improvement and Seed Industry

1. Dairy farmers own part of the companies. Mostly cooperative business or grow out of cooperative.
2. Seed companies have their own farms as well as they outsource production
3. Potential of different grasses and legumes needs to be studied in Pakistan. Potential of testing by NARC at different locations of the country. There were forages which have cutting potential and even cutting after every 21 days.
4. ICI is distributor of Pacific Seeds (Jumbo, etc) in Pakistan.
5. Nutrifeed is Millet forage that is prussic acid free. Similarly another forage is Sugar Graze (sweet sorghum x sweet sorghum). Sugar Graze good for silage.
6. JPL, Pakpattan is distributor for Blue Ribbon Seed & Pulse Exporters. Trying different types of fodders in Pakistan. Willing to cooperate with fodder research program at NARC.
7. Callide variety (Rhodes grass) removes salt from soil. Stylo is a beef buiders forage. Maxa millet has long growing season with high palatability and digestibility.
8. Milk brokers have now started operating in Australia also. These also supply to the milk plants. Their profit is 3 to 5 cents / litre.
9. The price of milk supplied to the milk plants varies during different times of the year in Australia.
10. Cooperative industries have tax incentives and have access to concessional loan from semi-government bank.
11. Farmers who supply more milk get better price than small farmers.
12. Dairy industry has dairy advisors and out reach program.
13. Diversification of dairy products yields better profit. Some novel products like lactoferrin, body building formula, infant formula, travel grid (for travel diarrhea), etc.
14. Friesian and Jersey crosses have better fertility and less animal health problems.
15. Mating scheme for J x F crosses is: F1 x Aussie Red, offspring x Holstein, offspring x Jersey and so on.
16. SNP based screening of calves has already been started. > 500 SNPs on a single microarray. Using 55000 SNP the accuracy currently is 55 %. 80 % accuracy will be required for adoption in the field.
17. Basic criteria or selecting bull is Estimated Profit Index.
18. Minimum cost to produce a progeny tested bull is 0.5 million \$ and time is 6 years.
19. Sexed semen is normally sold at 4 times the normal dose price.

Livestock Exporters

1. Austrex is involved in live animal export. Both beef and dairy cattle are exported to many countries.
2. Austrex owns its own quarantine facility.