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AZERBAIJAN COMPETITIVENESS AND TRADE (ACT) PROJECT

Second Mission Report on Dairy Development

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Acronyms

ACT	- Azerbaijan Competitiveness and Trade Project
AI	- Artificial Insemination
AZN	- New Azeri Manat
AIM	- Agro Information Centre
BDS	- Business Development Service
CF	- Crude Fiber
CP	- Crude Protein
DMI	- Dry Matter Intake
EE	- Ether Extract
FAO	- Food and Agricultural Organization of the United Nations
GDP	- Gross Domestic Product
GoA	- Government of Azerbaijan
GiZ	- German International Cooperation
JAC	- Janub Agribusiness Centre
LN	- Liquid Nitrogen
LRI	- Livestock Research Institute
MCC	- Milk Collection Centre
MCP	- Milk Collection Point
ME	- Metabolizable Energy
MoA	- Ministry of Agriculture
MT	- Metric Ton
NFE	- Nitrogen Free Extract
NGO	- Non-Governmental Organization
SSC	- State Statistical Committee
SVD	- State Veterinary Department
UMID	- Humanitarian and Social Support Centre
USAID	- United States Agency for International Development
USD	- United States Dollar
VAT	- Value Added Tax
WB	- World Bank

Summary

The second mission on dairy development, which took place between 12 May and 20 June 2011, focused on two major aspects:

- Stimulating the main dairy companies to cooperate in their efforts to strengthen the development of the dairy sector, and
- Capacity building of extension agents and service providers, especially on animal nutrition and feeding management.

During the first mission in March 2011 the dairy sector was studied and recommendations for further development were formulated. It was pointed out that the quite sudden increase in processing capacity would lead to a higher demand for raw milk, but not necessarily to higher quality or production. Some form of coordination and cooperation would be needed to agree on minimum standards for raw milk, to stimulate investments in dairy farming and to develop a dairy policy which reflected the needs of the sector.

Dairy Processing Companies

First meeting with most of the leading dairy companies was organized with the aim to see if there was a shared interest in discussing constraints and opportunities together and to identify priorities for further action. It turned out that even though all companies are clearly aware of the fact that they have to compete not only for raw milk but also for their retail markets, they face common problems which need to be addressed together.

Poor raw milk quality and very small quantities per farm, unfair competition from unlicensed processing units and open sales, lack of investment support and insufficient involvement in dairy policy formulations emerged as the main issues to be given further attention.

After the meeting each participating company received the minutes of the meeting, plus a draft version of the new milk quality standards that are presently developed by a working group involving several dairies. Based on further feedback and discussions, a position paper was prepared to form the basis of a roundtable meeting with representatives of government. This meeting is scheduled to take place in September 2011, after proper preparation and consultation with all stakeholders.

In support of these activities a working paper was prepared on milk quality standards and control. Here we see that the proposed Azeri standards are very similar to those of the European Union (EU), but that only the larger and more professional farms will be able to achieve these standards. The vast majority of households keeping a few cows will not even

come close to these standards. Moreover, sampling and testing of the milk of individual suppliers is costly and time consuming. It is not surprising that most dairy plants consider the establishment of their own dairy farm.

In many countries we have seen that with the introduction of stricter quality standards for raw milk and a pricing system that rewards first class milk, the small milk producers left the dairy business. Instead a more professional dairy farmer emerged, certainly when the conditions for investments and marketing were made attractive enough. We may see a similar development in Azerbaijan, although here the enforcement of quality standards and food inspection may take some time.

Capacity Building

Even if we assume that many households will never become professional dairy farmers, we still have to try to improve the production level of their cows and at the same time stimulate them to invest in farm expansion. That can only be done by providing them with practical information. Simple messages that can be easily applied and show a direct benefit. Even a simple message needs a good understanding of animal production: what is essential, what changes have the strongest impact on farm economics.

Capacity building of extension staff and service providers is essential to create awareness among farmers on modern techniques of milk production. During the two courses on Feeding Management (Agjabedi and Lankaran) it became apparent that most advisors can benefit from new knowledge and a practical approach towards dairy farm management. The positive response from the participants further indicated that they are eager to receive new information.

During the first day of each course the basic principles of ration calculation were discussed: how to balance the requirements of a cow with the available feeds. A ration was calculated together, after which the participants were divided in groups and had to practice themselves. This approach to rationing was new to them, so it took some time to get familiar with the system. The next day the groups went to a farm where they were given specific assignments: looking at barn conditions, feed and feeding, cow condition, manure, etc. On return to the training room each group was asked to mention the strong and weak points of the farm. Based on these findings farm advice can be formulated. All information material used during the training was translated in Azeri and handed out.

During the mission we received training material on dairy production that was developed by AIM and Golden Feed. Some material produced by JAC was already reviewed briefly during the previous mission, but these handouts were not yet made available. All available information was assessed based on its technical contents and practical value for dairy

farmers. It is especially important for the practical value that these papers be re-written. Instead of theoretical information farmers will need clear and simple instructions on how to feed and what to feed. During a follow-up mission, once the contracts with the selected service providers have been signed, the development of improved handouts and posters will be addressed further.

The AIM laboratory was visited again. It became clear that installation of the equipment and training of staff all had been done in only three days. This is barely enough to train the staff in the basic use of the equipment. The equipment for determining ash content in a feed sample had never been used, as the procedures were not clear.

Another concern is that the staff does not have a clear understanding on how to translate the results into useful recommendation for rationing. The State Veterinary Department is also involved in feed analysis and similar samples were tested at both labs, with different outcomes. We are still in the process to identify what is the best solution to overcome the present constraints in feed analysis and determination of energy values of feeds.

Other Activities

In addition to the above inputs, further contacts were established with other key-players in the dairy sector:

- Hadji Djamalkhan in Salyan (300 milking cows and expanding to 1000)
- Sheki Agro in Sheki (600 milking cows)
- Azeryem Feed Factory, Balakan
- Golden Feed, Ganja
- Government Bull Station and AI Center, Ganja
- Pal-Sud, Milk-Pro, Gilan Zagatala and Gilan Gabala Dairy Plants

Each of these visits contributed to a better understanding of the constraints and opportunities in the dairy sector. More detailed information is provided in the main report.

Next Steps

The process of bringing the key players together has been initiated and the main task now is to keep them involved as a working group that can advise government on dairy policies and that will agree on coordinated efforts to stimulate the development of more professional dairy farming. The organization of a roundtable meeting involving all relevant ministries and all key players in the private sector is under preparation and scheduled to take place in September.

The capacity building of service providers needs to be continued. Training of trainers is essential, as they are the ones to teach all milk producers how to improve production and milk quality. A 2-day course is not enough to give these trainers the necessary background to become good advisors. Follow-up training on nutrition and initial training on all other aspects of dairy production are needed. Part of the training will be used to develop more practical handouts on dairy production.

*Training of trainers is essential
and follow-up is needed*



1 Introduction

The Dairy Sector Study that was carried out in March 2011 by the ACT/USAID project showed that the new investments in milk processing will give a strong impulse to develop the dairy sector as a whole. The growing demand for (high quality) raw milk will motivate farmers to invest in improved breeds, better nutrition, higher milk quality and more animals per farm. However, this sudden increase in processing capacity will require coordination from all key players to monitor developments, to share information and to decide on specific action plans, especially to improve milk quality standards and to reduce the strong seasonality in raw milk supply. It was also clear that continued support of the government will be needed to create a conducive environment for private sector development.

The action plan developed by ACT/USAID is based on the understanding that the milk processing industry is the engine of the dairy sector. Therefore ACT/USAID facilitates the organization of regular meetings between the leading milk processors and subsequently with the government and other key players in the dairy sector to discuss dairy policy, to set priorities and to address specific issues that need attention. During the present mission milk quality standards and government support to introduce stricter control measures on food safety and food handling were given the highest priority by the processors.

The new developments in dairy production require technical advice on milk production, which can be provided by existing service providers, veterinarians and/or advisors hired by the dairy plants. A constraint is that extension staff has not been able to obtain much experience on modern dairy farming, as there are only very few high productive farms in the country and no practical training centers to develop new skills. Training of trainers is needed to meet the requirements in skills and know-how in the field.

Training of trainers is essential. The picture shows the Lankaran group that participated in the course on Feeding Management.



During the present mission a start was made with this training-of-trainers. As a well-balanced ration is essential to increase milk yields, feeding management was selected as the main topic for training. In addition the genetic capacity of dairy cattle has to be improved and this can best be achieved

through the use of artificial insemination. This requires strengthening of the present AI services. Based on a survey in the milk collection areas, villages will be identified where AI services are economically justified and potential inseminators will be selected for training. During the mission the necessary preparations were made to conduct these surveys and training programs.

The small scale of farming and the fact that most households consider dairy production as a side-activity make it difficult to reach higher yields and better quality. The development of more professional dairy farming should be stimulated. This should be done by identifying farmers that are eager to develop dairy farming as a business and are willing to function as demo farms.

The next pages provide a more detailed description of the activities that took place during the mission, with recommendations for the next steps to be taken in this process of dairy development.

2 Key-Players in the Processing Industry

2.1 Roundtable Meeting

The main challenges of the milk processing industry are to obtain more milk of a better quality, at a competitive price. Most processing companies are considering the establishment of their own large-scale dairy farm as a solution to the constraints of collecting poor quality milk from thousands of households. This would indeed be the easiest solution, but perhaps not the most desirable from a development point of view.

During the Sector Study meetings were arranged with most of the leading dairy companies and the picture emerged that they all struggled with the same problems: increasing prices for raw milk, without any progress in quality improvement. Households that are not willing or able to invest in better nutrition and genetic improvement, competition from local cheese-makers that accept any quality raw milk and no government controls on food safety for sales at the open markets.

We suggested to bring the ten to twelve leading dairy companies (covering around 90% of the formal milk processing capacity in Azerbaijan) together to discuss the above topics and assess in which areas they would be willing to work together. Since these companies are located in various places all over the country, sufficient time was needed between the invitation and the actual meeting to ensure their availability. The agenda for the meeting was:

Friday, May 27, 2011

10.30 -10.35 Opening & Welcome – Melani Schultz

10.35 - 10.50 Presentation on options for dairy development – John Bonnier

10.50 - 12.00 Discussion on possible cooperation to solve major constrains in milk supply and production (quality, seasonality and supply per farm)

12.00 - 12.15 Conclusions

After the presentation each of the participants was invited to give his/her view on the present conditions for dairy development and to identify priorities for further cooperation and follow-up activities. It soon became clear that raw milk quality was a concern for all processing companies, but an even larger concern was the 'unfair' competition from local processing workshops. The small processors purchase any kind of milk and operate without any quality control or government standards. The participants all felt that the government should have a much stricter control on informal markets and open sales.

The meeting closed at 13.30 hours after lively discussions and it was agreed that the next step would be the organization of a roundtable meeting with government representatives. In preparation of that meeting, discussion papers will be circulated to further define the topics and contents for discussion.

All background information related to the Roundtable Meeting of 27 May has been attached to the report as Appendix 2 (invitation, presentation, minutes, discussion paper on milk quality control and the position paper for the next meeting).

2.2 Raw Milk Quality Standards

New government standards for raw milk are being developed by a working group involving the private sector and a draft version was later distributed among the participants of the roundtable meeting.

These new standards (see the summary table in the discussion paper on Milk Quality Control - Appendix 2) are very similar to the EU-standards and largely based on GOST standards and testing methods. For large scale farms or professional dairy farms these standards are quite useful and applicable. The problem is that the dairies collect a substantial part of their milk from households, which deliver milk that is far below these standards.

The new standards distinguish four grades of milk: Extra, Excellent, First and Second. The first three grades are quite similar and it would have been enough to work with two grades (Extra and First). Second Class milk is defined as milk that has a maximum bacteria count of 4 million/ml and that does not pass the alcohol test (75%). In reality we are dealing with milk with 10-15 million bacteria/ml, and the alcohol test is seldom performed at the farm level. The proposed standards also mention an approach for testing (frequency and test methods) which cannot be realized at the household level.



During the mission we had an opportunity to join the milk quality control manager of Pal-Sud, Mirac Yasar, during the morning milk collection. The milk collector goes by truck and a 600 liter tank from door to door to collect an average of 4-5 liters/household. The organoleptic test (visual appearance, smell and taste) is the basis for acceptance. Milk is supplied in all kinds of containers of which we do not know how well these are cleaned. Milk composition varies, but at this stage we have no way to determine the differences. In case of doubt, some collectors use a refractometer to detect added water. Added water and acidity are the main reasons for rejection.



Milk collection in the Lankaran region: at the back the truck with a 600 liter milk tank, in front the women that supply their milk in all kinds of containers.

An important question is how to bring reality in the field and proposed standards closer together. In view of the small quantities per farm and the large number of farmers, it is very complicated to test the milk from each supplier and to pay them according to composition and quality. The first step would therefore have to be by paying the milk collector according to quality: either by testing his bulk supply or by testing smaller quantities if his milk is supplied in different containers. Minimum (and similar) acceptance standards should then be maintained by all dairy companies.

It is here that the main problem arises. If the milk is rejected by the leading dairies, the local cheese-makers will still accept that milk and be able to use it at a profit. In addition there is a serious shortage of supply in winter, which makes it very difficult for the dairies to reject milk, even if they are not satisfied with the quality. It is for this reason that the dairies want to ask the government to implement stricter controls on quality and food inspection. Now the leading dairies are expected to meet HACCP and ISO standards, but their small-scale colleagues are still allowed to produce cheese under unhygienic conditions, without pasteurization and without meeting any standards of food safety.

During the roundtable meeting with government officials this topic will be high on the agenda. It is clear that these problems cannot be solved overnight, but will take time and a step by step approach.

2.3 Common Trade Barriers

The main challenge for the milk processing industry is to obtain enough milk of good quality throughout the year. In addition we have identified 'trade barriers' which have a negative impact on dairy development, such as VAT issues and high feed costs due to certain monopolies.

At an internal meeting of ACT, trade barriers were discussed and one of the suggestions was to divide the identified barriers into three groups: legal issues, monopolies and ‘informal duties’. This division makes it possible to address each barrier in a specific way.

One clear (not legal) barrier is the ban on imports and distribution of semen for cattle breeding, imposed by the Department of Animal Breeding. The legal justification for this measure is very weak as the main reason is to enable the government bull-station to increase sales and thus cover the operational costs. Meanwhile the Dutch Ambassador in Baku has submitted a formal complaint and also sent a Letter of Concern to the Minister of Agriculture.

All livestock value chains are facing high feed costs and partly blame this on VAT charges on imported and locally produced feeds, without being able to charge these costs to the end-consumers. Several short-term experts are involved in this issue and we expect some clear answers and recommendations on tax-issues and their effect on local production of feeds and feed costs for the livestock producers. Monopolies are known to exist and this has a negative effect on prices and availability. For dairy farmers the best option is to improve their forage quality and thus save on compound feeds.

Forage quality has to be improved to save on the costs for compound feed



2.4 Dairy Development Policy

While Azerbaijan is commonly associated with its significant oil and gas reserves, agriculture traditionally has also been an important part of its economy. However, the neglect of agriculture over the past 20 years has done great damage to the sector. Whereas agriculture once accounted for half of Azerbaijan’s GDP and supplied as much as 30% of the USSR’s demand for fruits and vegetables, agriculture accounted for only 6.4% of the country’s GDP in 2009. The sector’s total production in 1997, according to official statistics, dropped to 43.9% of the level it had in 1985. After that year a gradual improvement was reported, mainly for the livestock sector. Cash crops like cotton, tea and grapes almost completely disappeared, although presently new vineyards are being established.

Investments have lagged behind: until 2006 less than 1% of the total investments were used for agricultural development. After 2006 investments increased to 3.5% or 266.6 million AZN in 2009. Fixed assets consist for 76.9% of buildings and for 14.8% of machines and equipment, which are all outdated. Salaries are the lowest in agriculture. Official statistics give monthly wages for agriculture of less than 135 AZN, while in industry and construction the wages are three times higher (around 400 AZN/month). Nevertheless more than 1.5million persons or

almost 40% of the working population remains engaged in agricultural production – more than in any other sector. For just this reason alone, farming is vital to Azerbaijan’s future.

The Government of Azerbaijan has declared agriculture as one of the priority areas for development and through a number of measures, e.g. tax exemption and credit facilities, tries to stimulate investments in this sector. Investments are clearly visible in the dairy sector as at this moment no less than nine modern dairy plants recently started operation.

The Gilan dairy in Zagatala is one of the new dairy plants that just started operations



Until the mid-nineties farming in Azerbaijan was dominated by the state- and collective farms. Since then the majority of collective and state dairy farms were privatized, which meant that the land and cattle were divided among the workers. Organized, large-scale farming came to an end, to be replaced by a large number of family farms, households and officially registered private farms. If we look at the share of the large-scale farms in the total milk production we clearly see the enormous change that has taken place. Large-scale farms produce less than 1% of the milk.

According to sources at the Ministry of Agriculture there are only 12 farms left in Azerbaijan with more than 200 cows and only 247 farms count more than 50 cows. Many of those are keeping their cattle under extensive production systems and milk production on these farms cannot be compared to modern, high producing dairy farms. Farms with a production of more than 6000 l/cow/year are very few.

This situation poses the government with difficult policy decisions. After stimulating investments in modern dairies, these dairies now face a lack of milk supply which may result in serious operational losses. The establishment of the state-owned company Agroleasing aiming at the provision of subsidized inputs and agricultural services to develop production potential has had little effect on dairy development. Many farmers cannot manage the imported heifers and most input prices are at market values even at subsidized rates.

Large scale or small family farms: what is the best option for dairy development?



The main question now is if we can expect the households to invest in farm development or if it would be better to give all attention and support to large-scale farming initiatives. From a development point of view it would be best to develop a professional farming community (family farms), but from a purely commercial point of view, large-scale farming is more attractive and a faster solution.

The planned meetings with government representatives will have to clarify where the development priorities are and how these can be best achieved.

3 Capacity Building

3.1 Training Courses on Feeding Management

Two training courses on feeding management were conducted, one in Agjabedi and one in Lankaran. The participants mainly belonged to AIM and JAC respectively, but also included representatives from a few dairy plants and some farmers (see list of participants in Appendix 3). The program was as follows:

Day 1

09.30 - 12.30 Presentation on the basic on animal nutrition and ration formulation

12.30 - 13.30 Lunch

13.30 - 17.00 Practice in ration calculation and presentation of results

Day 2

09.30 - 10.30 Introduction on cow signals and farm inspection

10.30 - 12.30 Farm visit and observations on farm management

12.30 - 13.30 Presentation of findings and final conclusions

During the first day of each course the basic principles of ration calculation were discussed: how to balance the requirements of a cow with the available feeds. What is the nutritional value of feeds? What are the basic steps in ration calculation? A ration was calculated together, after which the participants were divided in groups and had to practice themselves. The approach to rationing was new to them, so it took them some time to get familiar with the system.



The next day the groups went to a farm where they were given specific assignments: looking at barn conditions, feed and feeding, cow condition (body condition score), manure, etc. On return to the training room each group was asked to mention the strong and weak points of the farm. Based on these findings farm advice can be formulated.

All participants received handouts on the information used during the training (presentation, feed requirements, feeding values, guidelines for ration calculation, farm inspection list - see Appendix 3).

During the first course in Agjabedi, Allen Young, senior extension specialist from Utah State University, participated as a guest trainer. His support and input was much appreciated.

The evaluation forms for both courses show that the training was appreciated and indicated a demand for more, especially practical courses. Time was a bit short to cover a complex topic like animal nutrition and the conditions for practical exercises on the farms were not optimal. In Agjabedi the barn was too small to allow all participants to walk around the cows (as is necessary for condition scoring and other observations), while in Lankaran the cows were in the yard. This too made observations a bit more difficult. Nevertheless the essential points were all covered and gave enough information to draw conclusions on feeding management.

3.2 Review of Available Extension Material

During the previous mission the extension material of JAC was briefly examined, but as there was no contract with ACT this material could not (yet) be made available. However, the first impression indicated that the practical value of this material needed to be improved.

During the present mission a handout on dairy production and three workshop manuals from AIM were made available. This material was reviewed and the main conclusions are listed below:

1. Handout for large-scale dairy farms with productive cows

In this handout the nutritional requirements of high productive cows are described, but although several points are correct, the approach to feeding management lacks proper logic. Some recommendations on rations are not correct and need to be adjusted. All in all we must conclude that dairy farmers with high productive cows will learn little from this handout.

2. Workshop Manual on Nutritive Value of Feeds

On page 1 the paper provides information on topics covered during the workshop, time needed (3 hours) and necessary classroom requirements. The paper discusses energy (Russian feed units) in the feed and mentions that roughage is the basis of animal feeding (which is very true). Subsequently the rationing for the different periods during a lactation period are briefly described and a list of feeding values (without dry matter content) and feed requirements are attached. Although the workshop covers some important aspects of feeding, nothing is really made clear or explained properly.

3. Workshop Manual on Feeds

On page 1 the paper provides information on topics covered during the workshop, time needed (3 hours) and necessary class-room requirements. After a lengthy introduction the paper mentions two types of feeds: natural pastures and fodder crops. After some historical background the fodder crops are divided in sub-groups: roughages (e.g., alfalfa and its conservation in different products) and feed crops (e.g., grains, soybean and other ingredients of compound feed). In addition other feeds and by-products are briefly described. The intention of explaining feeds is very valuable, but the way it is presented can certainly be improved.

4. Workshop Manual on Premixes

On page 1 the paper provides information on topics covered during the workshop, time needed (4 hours) and necessary classroom requirements. After an introduction on the value of making production groups (note: only possible at large farms) the manual mentions handling of feeds, feeding standards and defines compound feed. Then there is a list of possible ingredients, including minerals and vitamins, followed by a brief description of their function. Two products are described in more detail and finally the manual talks again about ration calculation of high producing animals (similar to the handout). The information is very general and there are no clear tables to simplify the contents.

The final conclusion is that even though the extension material mentions good points, the presentation lacks logic and does not meet the needs of the potential users. Still much work needs to be done to improve these extension papers and make them of practical value for either households or professional farmers.

3.3 Development of Training Materials

The development of new training material on dairy production is necessary and should cover all basic topics such as nutrition, reproduction, milk quality control, animal health, calf rearing, housing and fodder production and conservation. From what we have seen, we cannot expect the staff of AIM, JAC or UMID to do this alone. Therefore the best option is to do this jointly, with support of ACT.

The training material that was developed for the courses on feeding management, plus the manuals on calf rearing and body condition scoring can serve as the basis for further handouts. It is important to determine who will be the users of this information. Are we developing handouts for the households, or preparing information material for specialized dairy farmers and extension staff?

3.4 Support to AIM Feed Laboratory

During the first mission we received a printout of the chemical feed analysis of some feeds, together with recommendations for ration formulation. The analysis was done by the USAID funded lab, while the advice was formulated by the AIM extension staff.

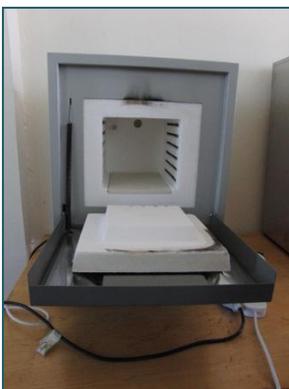
The chemical analysis included dry matter, crude fiber, crude fat and crude protein. For ration formulation it is essential to determine energy content of the feed. This can be expressed as metabolizable energy (ME), or as net energy (NE) in Mcal, MJ or another feed evaluation system (e.g., Feed Units based on barley or oats). The energy that is available for milk production (NE lactation) depends very much on the digestibility of the feed. Especially the fiber content and the composition of the fiber has a strong influence on digestibility. In these days most countries the NDF and ADF contents of a feed are determined and used in the calculation of the energy value. Unfortunately these data are not available in Azerbaijan.

Until the introduction of ADF and NDF by Van Soest in 1960, the crude fiber method was used for many years to determine energy value. That system has several disadvantages. The digestibility of crude fiber varies for different forages and laboratory test results may be quite different due to the various ways in which crude fiber is measured. This often leads to either over- or underestimation of forage.

As enquiries in the Netherlands did not (yet) give conclusive answers on how to solve this problem, the State Veterinary Laboratory in Baku was visited. This lab can also do feed analysis and the management informed us that they have a method to calculate energy content. It was agreed to send a sample for analysis and we made use of the opportunity to send the same sample (hay from natural grass, mature stage) to both laboratories for comparison of results. The results are:

	Values (%)	
	SVL	AIM
Dry matter (DM)	n.a.	89.0
Crude protein (CP)	13.9	6.3
Crude fat (EE)	3.6	0.7
Crude fiber (CF)	28.7	26.6
Ash	7.8	n.a.
Feed Unit (Russian system)	0.5	n.a.

There are substantial differences in results, which makes it even more difficult to understand their actual value in feed rationing. The CP content in the SVL results appears far too high for poor quality hay and the AIM result is more likely to be accurate. CF is fairly similar, but still lower than expected. The Russian energy value (FU) is based on a medium quality oats, which is set at 1 FU (or equivalent to 1425 Kcal). In this case it is not clear how this energy value has been calculated.



The equipment in the AIM lab was installed in a period of three days, during which the staff was trained in the use of this equipment as well. Far too short to make them real familiar with both equipment and the relation of the test results to the use in animal nutrition. Ash is not determined, even though all equipment is available, because the staff has never been trained in its use.

The oven at the AIM lab for the determination of ash: not used because the staff was never trained properly.

Ash is important as in the old system of energy calculation the NFE (nitrogen free extract) has to be calculated. NFE is $100 - (CF, EE, CP \text{ and } Ash)$. The first step is then to determine the Gross Energy with the formula:

$$GE \text{ (kJ/kg DM)} = 24.14 \times CP + 36.57 \times EE + 20.92 \times CF + 16.99 \times NFE$$

The next step then is the calculation of the ME (kJ/kg DM) for which the digestibility of the various components are needed. It is here that we still need to obtain additional information as each feed has its own specific digestibility.

The first step is to teach the staff at the AIM lab how to determine ash content. This could be done with support of the State Veterinary Laboratory. At the same time we will ask the SVL how they calculate the energy value and compare this to the system that was used in Western-Europe.

3.5 Development of AI Training Program and Budget

An expansion of AI (artificial insemination) services is needed in those areas where raw milk is collected by the formal dairy plants as this will help to improve the genetic quality of the dairy cows and thus their milk production.

The action plan includes a survey, to be conducted by the service providers JAC and AIM, which:

- Identifies the villages which presently lack these services,
- Evaluates the quality of the AI services in the areas that are covered, and
- Identifies candidates for the training of insemination skills.

A draft approach for this survey has been attached as Appendix 4. After identification of candidates, the training programs can be implemented. The first course is scheduled for mid-September.

Two organizations have been asked to submit a program, budget and CV of their trainer. Both organizations (Agro Lider and Norwegian Humanitarian Enterprise) are directly involved in the provision of AI services and have organized training courses in the past.

The proposed course will have a duration of one week and covers both theoretical and practical training. At the end of the course a final examination determines if the trainee has the proper skills to work as an inseminator. As practical skills are essential, each course should not have more than 6-8 participants. This also means that live animals are required for practical exercises. See appendix 5 for the suggested course content.

3.6 On-the-job Training

On-the-job training is an ongoing process and mainly takes place through the close working relationships, joint field visits and shared information.

On-the-job training during field work.



4 Field Visits

4.1 Milk Processing Companies

In order to obtain a better understanding of the challenges of the processing industry, visits were paid to Milk-Pro in Baku, Pal-Sud in Lankaran, Gilan in Zagatala and Gilan in Gebele.

Milk-Pro is the oldest of the leading dairy companies and its experience in milk sourcing and quality control is very valuable. For many years they have tried to achieve some progress in quality improvement at the household level, but no significant changes have taken place. Their preference is clearly for the development of medium and large-scale farms. The growing competition for raw milk has made milk sourcing even more difficult than it was. The meeting with M-Pro mainly focused on the new standards for raw milk, which needed further clarification.

Pal-Sud has been in operation for several years and is facing similar problems in milk sourcing as Milk-Pro. The milk they receive from the few large-scale farms meets the desired quality standards, but the milk from households is of poor quality and very difficult to improve. Pal-Sud intended to establish its own large-scale farm, but the land offered by the government was not suitable. Their new ice-cream factory helps to utilize the surplus milk in summer and thus enables them to purchase all milk from their regular suppliers throughout the year. After the roundtable meeting, the Pal-Sud director mailed us his main points of concern and recommendations. Most of his views are shared by his colleagues.

The Gilan Holding has recently established five new dairy plants at different locations throughout Azerbaijan. This company is a new player in the dairy sector and the management is still working out the best approaches for milk sourcing and marketing. Milk sourcing is still in an early stage, as the market for their dairy products is also just being developed. In Gabala the company has started the construction of a large-scale dairy farm and more farms are being planned.

4.2 Dairy Farms and Local Milk Producers

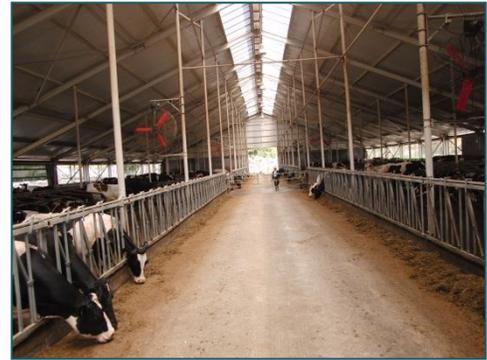
Two large scale farms were visited: Hadji Djamalkhan in Salyan and ShakiAgro in Shaki.

The Hadji Djamalkhan farm was established in the mid-nineties and consists of a dairy farm, fruit production and arable land. The dairy farm presently has 300 milking cows plus young stock, all Holstein Friesian. Milk production is > 6000 l/cow/year and part of the milk is processed on farm. The farm is in the process of expanding: new barns are under construction. Compound feed is obtained from Azeryem and



silage is produced on farm. The farm appears to be well managed and is certainly one of the best in Azerbaijan. Calf rearing had given some problems in recent years and there was uncertainty about the use of concentrates in relation to milk. During a visit to the main office in Baku, information material on calf rearing and the use of milk replacer was provided (see Appendix 6).

The ShakiAgro farm was established in 2007 and has 600 milking cows, making it the largest farm in Azerbaijan (at least for the time being). Here too milk production is > 6000 l/cow/year. Although the farm has processing facilities for hard cheese, all milk is sold to the leading dairy plants. The attractive price of 0.55 AZN/kg for raw milk and the high demand for quality milk does not stimulate farm management to engage in the processing and marketing of cheese. Here too improvements in farm management are still possible, but the overall situation appears to be quite good. Managing high productive Holstein cows is not easy and places high demands on nutrition, health care (mastitis prevention, reproduction and metabolic disorders) and housing conditions.



Both farms would be ideal places for students from the agricultural university in Ganja to obtain some practical experience. Good farm managers and veterinarians are difficult to find in Azerbaijan and the university program is mainly based on theoretical knowledge.

The contrast with the small local milk producers is enormous if we look at the housing conditions of the cows, their feeding and management. Most local cows are kept in dark, poorly ventilated barns during winter, fed poor quality hay from natural grass or alfalfa and produce accordingly. During the time of the field visit many farmers were busy with hay making, while large herds of sheep and cattle were moving towards the summer pastures in the mountain areas.



4.3 Feed Factories

The 'Golden Feed' factory in Ganja was established with support of USAID and now works independently. The owner/director, Mr. Huseynov, runs the feed mill with his two sons and four employees. The factory has a capacity of 8-10 t/day of non-pelleted compound feed. Most feed is used in the poultry industry, but recently the factory had an order for 10 ton cattle feed (with a CP content of 12%). The sales price was 350 AZN/ton during the time of the visit, but may drop to 200 AZN during the summer (after the harvesting period). The factory only works on the basis of orders.

It was interesting to compare the feeding values of two compound feeds of 'Golden Feed' using standard values and the value determined by the AIM lab for wheat bran.

Compound mixtures Golden Feed											
Ingredient	% in mixture			Mcal				CP			
	1	2	3	1	2	3	3A	1	2	3	3A
Corn	11.2	12.5	13.6	22.4	25.0	27.2	27.2	112.0	125.0	136.0	136.0
Wheat	26.2	0.0	0.0	52.4	0.0	0.0	0.0	419.2	0	0	0
Barley	22.3	32.6	27.1	42.4	61.9	51.5	35.2	301.1	440.1	365.9	246.6
Wheat bran	23.2	31.5	34.2	37.1	50.4	54.7	37.6	396.7	538.7	584.8	290.7
Sunflower meal	11.1	17.5	19.0	11.1	17.5	19.0	19.0	287.5	453.3	492.1	492.1
Salt	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Siliate	3.0	3.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total mix	100	100	100	1.7	1.5	1.5	1.2	15.2	15.6	15.8	11.7

The wheat bran tested at the AIM lab probably contained quite bit of husks or other forms of contamination, which reduces not only the energy content, but also total feeding value of this ingredient. The effect is that the feeding value of the compound feed shows a remarkable reduction and for the same quantity of milk at least 10-20% more concentrate would be needed.

The high feed prices (caused by the high costs of ingredients) have a negative effect on sales and the factory has a difficult time to survive. Feed with higher CP contents are even more expensive and thus less in demand. A new product, apparently developed in Ukraine, is the steaming of soybean cake. The cake is mixed with water, heated to 105 °C and then cooled down again. 'Golden Feed' has a brochure with information on the company and some technical information on rationing. A fundamental error in total feed intake shows that the basic knowledge on animal nutrition is lacking and the management would benefit from some technical advice.

The second feed factory visited was the Azeryem feed mill in Balakan. This is a modern feed mill, with 6000 hectares of land to grow most of its feed ingredients. The factory can produce a range of 52 (pelleted) feeds. Seventy percent of the total production is for the poultry

industry (30% for parent-stock and 40% for broilers and household chicken) and the remaining 30% is for cattle (both beef and dairy). The factory has NIRS feed analysis equipment (near infra-red), which enables them to do a complete and fast analysis of all feed ingredients they use. For calibration and standardization they work together with a lab in Turkey.

Azeryem feed factory in Balakan: a modern plant producing 52 different types of compound feed.



For milking cows there are 4 different feeds, varying from 16% CP and 2200 Kcal/kg DM till 18% CP with 2500 Kcal/kg DM. Prices vary from 320 - 380 AZN/ton ex-factory. For Calves there are special feeds (for calves up to 2 months of age: CP 20-21 with 1600-1800 Kcal/kg, costing 415 AZN/ton and for calves of 2-4 months old 18% CP with 2000 Kcal/kg, costing 390 AZN/ton). In a country where most farmers feed alfalfa, which is high in protein, a compound feed with 12-13% CP would also be useful.

Soybean cake is mainly purchased and bought from local traders, sunflower cake is directly imported from Russia and Ukraine. Soybean cake, which mainly comes from Brazil and Russia, is not so easy to import for a private company. Moreover, as storage is difficult, it is easier to buy according to needs and at regular intervals from the local market. There is a substantial difference in the locally produced soybean cake and the one from Brazil: local cake has 38% CP with 18% fat, while imported cake has > 40% CP and 8% fat. This is mainly due to the fact that the local industry does not use Benzol to extract the oil.

Unfortunately the Azeryem management did not allow us to enter the factory itself and see the production process, but the overall impression was quite positive. The price of compound feed in relation to the average milk price, remains a point of concern.

4.4 Bull Station and AI Center, Ganja

In October 2010 the government bull station in Ganja started the production of deep frozen semen. Until that time all frozen semen was imported, either by the private sector (mainly from the Netherlands and Norway) or by government (Russia). The new station houses 20 bulls of different breeds: 9 Holstein, 4 Simmental, 1 Aberdeen Angus, 3 Brown Swiss and 3 buffaloes. The set-up of the AI center is functional and complete. As each bull is used twice a week, the stock of frozen semen rapidly grows and counts already more than 100.000 straws. Sales take place from Ganja and Baku, but more distribution points are foreseen.

The recently established bull station and AI center in Ganja



The staff is very motivated to produce a quality product, but the genetic potential of the bulls does not reach the quality of imported semen. All semen from imported bull comes from progeny tested bulls which have been selected from a large population and based on detailed performance and type classification data. The local bulls mainly come from imported heifers and have only been selected on the basis of pedigree information from a small group of available animals.

At present there is no information on the genetic quality of the bull, but we were informed that a catalogue is under preparation. This would at least enable the inseminators and farmers to make a selection based on breeding goals. The attempt of the department of animal breeding to stop imports and thus enforce the use of the locally produced straws is not in the interest of the dairy farmers and dairy sector as a whole.

The number of inseminations in the country is still too small (reportedly 60.000 in 2009) to cover the operational costs of a bull-station, which makes it even more difficult to manage the AI center. For the next years the expansion of AI services should be given priority. This can best be achieved by improvements in the distribution system of semen and liquid nitrogen (LN), awareness campaigns for farmers and the training of fully quality inseminators.

5 Next Steps and Recommendations

Dairy development is a process which takes time and a consistent approach. We have seen that there is an interest of the processing industry to work together on common challenges, such as raw milk quality standards. We also know that the development from households to dairy farmers is a long and difficult road. The processing industry stimulates households to produce more milk by opening the market, but will need more support from government to speed up developments.

The ACT/USAID project has developed its action plan and is now in the process of implementation. This process is based on the inputs of the selected service providers, JAC and AIM, STTA support and the ACT dairy development specialist.

The next steps follow as a logical continuation of the roadmap that was defined and agreed earlier:

- Enhancing the cooperation between key players to become a reliable partner for the government on dairy development policy and to define common approaches towards the increased production and higher quality of raw milk. This will require:
 - Further discussion and meetings with dairy companies,
 - Organization of a roundtable meeting with all relevant ministries and follow-up on the conclusions of this roundtable meeting,
 - Development of specific proposals on milk quality standards adaptation and implementation,
 - Individual support to dairy companies related to dairy development and milk sourcing.
- Capacity building, mainly through the training of trainers (farm advisors and veterinarians, either working for a BDS or processing plant). This will include:
 - Guidance on the development of handouts, posters and other training materials for specific aspects of dairy farm management
 - Further training of extension staff on animal nutrition and farm management,
 - Selection and training of inseminators in milk collection areas,
 - Continued support to the AIM feed laboratory.

At each step of the road we will have to ensure that there are measurable achievements. This will not only help to keep all key players involved and motivated, but will also enable us to monitor and evaluate the ACT performance.

APPENDIX 1

List of Persons Met

List of Persons Met

I would like to thank all the persons that made this mission possible and who were very helpful to provide information, to have open discussions on development issues and supported us obtaining a better understanding of the challenges and opportunities for dairy development. I especially want to thank Elnur Sofiyev for organizing all the meetings and arranging the field trips in such a splendid way.

- Elnur Sofiyev Dairy Value Chain specialist, ACT/USAID
- Ed Beaman Team Leader Component-3, ACT/USAID
- Melani Schultz Chief of Party, ACT/USAID
- Fizuli Guligev State Veterinary Department,
- Latifa Ahmadova State Veterinary Department, Chief Laboratory
- Zeki Ashchi General Director Pal-Sud Dairy Plant
- Islam Huseynov President Azerbaijan Dairy Association
- Cem Kurt General Manager Atena Dairy Plant
- Asef Namazov General Manager Bilasuvar Agro Dairy Plant
- Vahid Tanhaei Veterinarian, Azersun Dairy Farm
- Fayat Ugur General Manager Azersun Dairy Plant
- Saida Mamedova Quality Manager Milk-Pro Dairy Plant
- Zaur Agayev Executive Director Salyan Dairy Plant
- Reshad Hasanov Quality Manager Khirman Dairy Plant
- Mirac Yasar Quality Manager Pal-Sud, Lankaran
- Iskenderov Israel Executive Director UMID
- Ram Upadhyaya Dairy Consultant, UMID
- Allen Young Extension Dairy Specialist, USDA
- Tom Deeb Principal Advisor, USDA
- Neal Nathanson Acting COTR USAID
- Mobil Penjaliyev Chairman Janub Agribusiness Centre
- Mevlut Osman Akgul Senior Technical Consultant Intersun
- Fazil Jafarov Chairman Management Board AIM
- Maharram Hagverdiyev Manager Feed & Soil Laboratory, Agjabedi
- Alovzat Abdulov Senior Trainer AIM, Agjabedi
- John Gjertsen Program Advisor Norwegian Humanitarian Enterprise
- Fagan Agayev Program Manager Norwegian Humanitarian Enterprise
- Sahib Gedirov Veterinarian, Shaki Agro Dairy Farm
- Taceddin Babayev Manager, Shaki Agro Dairy Farm
- Jamalov Akbar Alikram General Director Hadji Djamalkhan Dairy Farm, Salyan
- Farhad Kerimov Executive Director Hadji Djamalkhan Dairy Farm, Salyan
- Zohra Tahirova AI specialist Hadji Djamalkhan Dairy Farm, Salyan
- Alovzat Huseynov Director Golden Feed, Ganja
- Mehman Hacıyev Azeryem Feed Factory, Balakan
- Mubariz Aliyev Veterinarian, Bull Station Ganja
- Haji-Zade Minaya S. Deputy Director Milk- Pro, Baku
- İlham Guliyev Manager Gilan Dairy Plant, Gebele
- Uzeyir Panahov Manager Agriculture, Gilan Holding, Baku

APPENDIX 2

Invitation Roundtable Meeting PPT Roundtable Meeting Minutes Roundtable Meeting Position Paper Milk Quality Improvement

Invitation Roundtable Meeting

№ L N-173/11

"18", May 2011

Hörmətli,

Azəf Namazov - Biləsuvar Agro
Zəki Aşçı - PalSüd
İslam Hüseynov - Emalçılar Assosiasiyası
İlham Hasanov - Milk-Pro LTD Cem
Kurt – Atena
Vahid Tanhaei – Azersun
Zaur Ağayev – Səlyan Süd zavodu Cavad
Quliyev – Səhliyalı MMC Chingiz – Bərdə
Süd Zavodu
Ramil Əzizov – Gilan Gəbələ
Mətanət xanım – Xırman Süd Məhsulları

ABŞ Beynəlxalq İnkişaf Agentliyi (USAİD) və Azərbaycan Hökuməti tərəfindən maliyyələşdirilən Azərbaycanda Rəqabətlik və Ticarət (ACT) Layihəsi ***Südün keyfiyyət standartları: minimum tələblər, keyfiyyətə nəzarət sistemləri və südçülüyn inkişafına yanaşma istiqamətləri*** mövzusunda dəyirmi masa keçirəcəkdir.

Məlumdur ki, süd emalı zavodları südçülüyn inkişafında həlledici rol oynayırlar. Onlar xam süd üçün bazar formalaşdırır və beləliklə fermerləri süd istehsalını artırmaq üçün investisiya qoymağa həvəsləndirirlər. Süd zavodları südün keyfiyyəti üçün standartları təyin etməklə, dəstək xidmətləri təklif etməklə və qarışıq yem kimi xammalın təminatında kömək etməklə təsərrüfatın inkişaf etdirilməsində fəal iştirak edə bilirlər.

Hal-hazırda Azərbaycanda biz elə bir vəziyyətlə qarşı qarşıyıyıq ki, emal imkanları ötən bir neçə ildə əsaslı şəkildə artmışdır, amma süd istehsalı demək olar dəyişməmişdir. Bu xam süd uğrunda rəqabəti və nisbətən aşağı keyfiyyətli süd üçün yüksək qiymətlərin ödənilməsi riskini artırır. Bilirik ki, öz məhsullarını satmaq üstündə müxtəlif süd zavodları arasında rəqabət olacaq, amma biz eyni zamanda inanırıq ki, müəyyən sahələrdə əməkdaşlıq bütöv südçülük sektoru üçün faydalı olacaqdır.

Bu sahələrdən biri südün keyfiyyət standartları üzrə razılaşmadır. Beləliklə xam süd üstündə olan rəqabət səbəbiylə, fermerlərin öz aşağı keyfiyyətli südlərini süd zavodlarına satmasını südün qəbulunda vahid standartlar tətbiq etməklə azaltmaq olar.

Birgə işləmək üçün digər səbəb hökumətlə hansısa ortaq bir problem müzakirə olunarkən bir yerdə təkliflərinizi verməkdir. Biz artıq keçən dəyirmi masada süd məhsullarının yararlılıq tarixlərini müzakirə etmişik və razılığa gəlmişik ki, südçülüyün inkişaf etdirilməsi istiqamətində real yanaşmaya nail olmaq üçün südçülük sektorunun təsirinin daha böyük olması vacibdir.

ACT layihəsi xidmət təchizatçılarının təlimatlandırılması və emal sənayesi ilə yaxın əməkdaşlıq vasitəsilə südçülüyün inkişafını dəstəkləmək istəyir. Təklif olunan görüş bizə südçülüyün inkişafı sahəsində fikirlərimizi bölüşməyə və əməkdaşlıq potensialını müzakirə etməyə imkan verəcək: emalçılar arasında əməkdaşlıq və ACT layihəsi ilə əməkdaşlıq və s.

Bu səbəblə, sizi 27 may 2011 tarixdə saat 10.30-da ACT layihəsinin ofisində dəyirmi masaya dəvət edirik və ümid edirik ki, Siz vaxt tapıb bu görüşdə iştirak edəcəksiniz.

Yer: ACT layihəsinin ofisi, Bəşir Səfəroğlu küç, 133, SAT plaza, 15-ci mərtəbə (5 mərtəbəyə yaxın)

Əməkdaşlıq üçün təşəkkür edirik!

Hörmətlə, Ed Beaman
USAID/ACT layihəsi
III Komponentin Qrup Rəhbəri

English text which was used as basis for the invitation:

We strongly believe that the milk processing companies plays a crucial role in dairy development. They create a market for raw milk and thus stimulate farmers to invest in measures to increase milk production. Dairy companies can also take an active part in farm development, by setting standards for milk quality, by offering support services and assisting with basic inputs such as compound feed.

In Azerbaijan we now face a situation where the processing capacity has increased substantially over the past few years, while milk production has hardly changed. This leads to more competition for raw milk and the risk of paying high prices for relatively low quality milk. We are aware that there will be competition between the various dairy plants to market their products, but we are also convinced that cooperation in certain areas will be beneficial for the whole dairy sector.

One area would be agreement on milk quality standards. Farmers should not be given the opportunity to sell poor quality milk to a dairy plant, because of the competition for raw milk.

Another area is on-farm support: now it is risky for a dairy plant to invest in on-farm development as there is no assurance that the farmers will continue their milk supply to the same dairy plant. If the competition offers a little more, the farmers are gone and the investment is lost.

A third reason to work together is to have one voice when it concerns common problems to be discussed with the government. You already discussed the new expiration dates for dairy products and agreed that more influence of the dairy sector is essential to achieve a realistic approach towards dairy development.

The ACT project would like to support dairy development through training of service providers and through close cooperation with the processing industry. The proposed meeting would give us an opportunity to share views on dairy development and to discuss the potential for cooperation: cooperation between the plants and cooperation with ACT.

We therefore like to invite you for a meeting at the ACT office on Friday 27 May 2011, at 10.30 a.m. and sincerely hope that you will all find time to attend.

Yours,

Insert PPT Dairy Development

(handout - 2 sheets)

Conclusions of Roundtable Meeting

Date and Location: 27 May 2011, ACT Office, Baku

Participants:	Zeki Ashchi	General Director Pal-Sud Dairy Plant
	Islam Huseynov	President Azerbaijan Dairy Association
	Cem Kurt	General Manager Atena Dairy Plant
	Asef Namazov	General Manager Bilasuvar Agro Dairy Plant
	Vahid Tanhaei	Veterinarian, Azersun Dairy Farm
	Fayat Ugur	General Manager Azersun Dairy Plant
	Saida Mamedova	Quality Manager Milk-Pro Dairy Plant
	Zaur Agayev	Executive Director Salyan Dairy Plant
	Reshad Hasanov	Quality Manager Khirman Dairy Plant
	Elnur Sofiyev	Dairy Value Chain specialist, ACT/USAID
	Melani Schultz	Chief of Party, ACT/USAID
Unable to Attend:	Rashad Babayev	Milk-Pro (SevimliDad Plant)
	Ramin	Gilan Dairies
	Shucaet	Barda Dairy Plant
	Cavad Guliyev	Sahliyali Dairy Plant
	Vilesh	Owner Milk Collection Company

Minutes and conclusions:

The meeting started with a word of welcome by Melani Schultz and a brief introduction by Elnur Sofiyev. Then John Bonnier presented „Options for Dairy Development“ in which he outlined the main challenges to be addressed:

- Increasing the productivity per cow and per farm
- Improving milk quality (composition and biological quality)
- Reducing seasonal variation in milk production and supply

He concluded his presentation with three questions to be discussed during this first roundtable meeting of milk processors:

- Can we agree on collection areas for raw milk and thus enable investments in dairy development?
- Can we agree on minimum standards and thus prevent farmers from selling milk which does not meet acceptable standards?
- What else can be done together and what are the priorities and conditions for cooperation?

Before the questions could be discussed the President of the Dairy Association stated that if we were going to talk about farm development, representatives of the milk producers should have been invited as well. John Bonnier replied that the main objective of this meeting was to see if

and how the processing industry could work together on common problems. At this stage it is not necessary to involve producers.

Subsequently each of the representatives of the processing industry was asked to give his views on these questions and it was encouraging to hear that all participants welcomed the opportunity to exchange ideas and to see in which areas cooperation could benefit each of them. The main comments are listed on the next page:

- All agreed that government support for dairy development is needed. It was concluded that a meeting with government representatives should be organized to discuss (1) investment support for farm development, (2) possible subsidies for premium milk supplied to dairy plants (3) stricter control on food safety and open market sales of milk and dairy products (4) consultation with the processing industry in policy development (5) review of policy to import heifers which cannot be managed by local farmers. ACT will prepare an agenda for this meeting with government officials and keep all participants informed.
- All agreed that quality standards need to be regulated as this also has a strong effect on raw milk price. All participants -with exception of the President of the Association- were very much concerned about the raw milk quality and want to make efforts to improve this quality.
- Mrs Saida Mamedova informed the meeting that she was involved in a working group on national quality standards for raw milk. She will forward the new standards to Elnur Sofiyev, who will mail all participants a copy.
- Simultaneously Zeki Ashchi and Asef Manazov will work with ACT on a proposal on milk quality standards and prices based on the actual situation in the field. The participants were asked to forward their ideas and suggestions on milk quality improvement to Elnur Sofiyev, so they could be used in the draft proposal for the gradual improvement of raw milk quality.
- Asef Manazov proposed (1) stricter control on quality at regional levels, (2) to avoid a price war on raw milk and (3) suggested a system of collective milk collection in combination with a distribution system. Reshad Hosenov was in favor of such an agreed distribution system as he felt that the present competition for raw milk was very strong and difficult. The other participants did not express their views on this proposal (yet).
- Vahid Tanhaei expressed his concern on the veterinary services and the technical skills of the veterinarians. Most vets miss the technical knowledge and practical skills to recognize diseases and/or to provide correct treatment. However, the villagers still have much confidence in their vets, which makes it even more difficult to convince them that this is not always justified.

- Cem Kurt pointed out that milk collection is costly and his suppliers are already complaining about the stricter standards in relation to the farm gate price. Farmers are used to add water to the milk, which is unacceptable. A joined effort to improve quality is essential, but dairy development should not only be a burden of the processing industry. Strong government support is needed.

At 13.30 hours the meeting was closed with the agreement that follow-up action will take place as agreed and that indeed the milk processors can work together on common problems.

Baku, 28 May 2011

Position Paper: Enhancement of the Dairy Industry in Azerbaijan

Background:

First of all we like to thank the Government of Azerbaijan for its strong support of the dairy sector.

Our group represents 12 of the largest and medium sized modern processing plants in the country with a daily capacity of 1,500 tons of milk per day and we purchase raw milk from thousands of rural households throughout the country, providing them a regular income. We respectfully submit our united vision on the important topics outlined below.

Azerbaijan produces 80 – 85% of its total milk and dairy consumption, while the remaining 15-

20% is imported from various countries, such as CIS-countries, Turkey, Germany and the

Netherlands. The imported products are mainly sold in shops and supermarkets to consumers with a higher disposable income; especially in Baku. It is this market share that the modern dairy industry has to compete with and this can only be done when our dairy industry meets international standards.

In many countries the processing industry is the engine for development and in Azerbaijan this can also be the case. Dairy plants provide an outlet for raw milk and thus create a market; not only for the farmers that supply the milk, but also for input suppliers and services that are needed to develop the sector.

In order to produce high quality dairy products, not only modern and well managed processing facilities are required, but also sufficient raw milk of an acceptable quality preferably meeting both Azeri and international standards. This is one of the main challenges for the modern dairy plants. Azerbaijan has a very large number of households that keep cows, but very few professional dairy farmers. The average household has less than 5 cows, which are kept under extensive systems and produce an average of less than 1,500 liter/cow/year. At present only

10% or even less of all raw milk is collected and processed by the modern dairy industry. All other milk is either consumed at home, used for home processing, sold to traders and informal processors or fed to the calves.

There is a strong seasonality in milk production causing extreme price and supply fluctuations. Dairy plants need a regular supply of raw milk throughout the year. This can only be achieved if

farmers improve the genetic quality of the cows. In addition, farmers will have to invest in the production and conservation of higher quality fodder and feed additional concentrates according to animal requirements.

With the substantial investments in dairy processing and the increasing demand for raw milk, there is a serious risk that competition will lead to higher milk prices without substantial improvement of milk quality.

Therefore the processors group is respectfully requesting to work with the appropriate government officials to address the following 3 major impediments, in a public/private effort to continue the growth of this strategically important industry.

Sector Concerns:

1. Unfair competition from unlicensed processors and traders: milk is processed or sold directly without any quality control and sold on the open market with no pasteurization, proper labeling, and without paying any taxes;
2. Increased competition for raw milk results in price increases, but does not improve raw milk quality or volume per farmer. The processing industry cannot solve the present problems in milk production without government support.
3. Labeling of dairy products should meet Azeri Government and international standards, but expiration dates should to be determined by the producers of dairy products. After all it is the processor who is ultimately responsible for the quality of its products and should therefore determine when these products can be safely consumed or keep their expected quality.

Recommended Government Measures:

1. We respectfully request the Government to take strong enforcement measures and not allow the unlicensed processing and sales of dairy products. Processing facilities of all size and capacity should be required to meet certain standards before they are approved. Food inspection will have to be carried out on a regular basis and a penalty system should be introduced and enforced.
2. In a public private partnership the Government and the processing industry will start a public service information campaign to inform the public on the health risks of consuming unpacked and uncontrolled dairy products. This can be done through awareness campaigns on TV, radio and in newspapers.
3. The Government should consider further supporting the development of a more professional dairy sector through innovative investment support for farmers that wish to

expand production resulting in more animals per farm and higher yields per cow. This can be achieved in various ways such as soft loans, premiums paid for steps implemented behind the farm gate to enhance milk quality, and through improved veterinary and extension services.

4. We urge the Government to increase its support for agricultural extension style training and agricultural education. There is a lack of well-trained and skilled professionals in the dairy sector. Curricula are outdated, practical training is very limited and teachers are underpaid.
5. We request the Government to work closely through regular meetings with all key players in the dairy sector in its formulation and monitoring of policy measures and legislation on dairy development. This includes representatives of the milk processors, farmers' organizations, service providers (extension, AI and veterinary) and input suppliers (e.g. seeds, fertilizers, feeds, veterinary drugs, farm machinery and farm equipment). We are anxious to share our first-hand knowledge of our industry for the mutual benefit of all Azeri citizens and our international visitors.

Conclusion:

The dairy processing industry pledges to continue making strong efforts to expand its milk collection area and thus further open the market for raw milk and dairy products thus helping thousands of rural households earn additional income from milk and dairy sales. In addition the dairy industry will support efforts to improve milk production and quality through maintaining the highest standards and providing price and education incentives to farmers who are seriously improving the quality and quantity of milk they produce.

In closing we want to thank the Government of Azerbaijan for its support and anticipated further cooperation. Together the members of the dairy processing community are committed to improving the quality of Azeri dairy products, and in building the domestic and international image of "Produced in Azerbaijan". These actions will improve overall food safety, create additional jobs, provide rural stability, and eventually lead to import substitution if properly implemented and monitored. We look forward to a long and productive public/private partnership with the government to make this dream become a reality!

Thank you for your anticipated support.

List of dairies:

Note: The dairy sector in Azerbaijan is being supported by the Agricultural Competitiveness and Trade (ACT) Project. This is a 3 year 21 million USD project jointly funded by USAID and the Government of Azerbaijan.

Milk Quality Improvement – Discussion Paper

1. International Standards

If we consider international (e.g. EU) quality standards, then raw milk should have:

- A freezing point of $\geq -0,520$ °C
- A specific weight (density) of at least 1 028 gr./liter at 20 °C
- A protein content of at least 28 gr./liter (2,8%)
- A solids non-fat content of at least 8,5%
- Somatic cell count should be < 400.000
- Bacteria count should be < 100.000
- Inhibitors should be absent

Raw milk should come from:

- Farms that are free from Brucellosis and Tuberculosis
- Farms that meet hygienic standards which minimize the introduction of hazards to milk and thus human health
- Cows that are free of diseases
- Cows that have no wounds on the udder
- Cows that not have been treated with substances that could harm human health and/or might enter the milk (unless the official waiting time has been reached)

Payment is based on fat and protein content, whereby the value of protein is more than twice the value of fat. Penalties are given for milk that does not meet the required quality standards. Milk with antibiotics is heavily penalized if found in the milk-truck. In winter the milk price is slightly higher than in summer to stimulate an even production throughout the year.

2. Proposed Azeri Standards

The new Azeri standards, as received from Saida Mamedova, are in many ways similar to the international standards (at least for „extra class“ milk). Here too milk should come from healthy cows and farms that meet hygienic standards. There are four grades:

Type of indicator	Norm for grades of milk			
	Extra	Excellent	First	Second
Minimum Protein %	3.0%	2.8%		
Titration acidity, °T	16.0 – 18.0			16.0 – 21.0
Purity Group	I			I-II
Density at 20 °C	1028.0		1027.0	1027.0
Freezing Point	$\geq - 0.520$			
Alcohol Test (72%)	I			not passed
Bacteria Count	< 100.000	< 300.000	< 500.000	< 4 million
Somatic Cell Count	< 300.000	< 500.000	< 750.000	< 1 million
Min. Bacteria	> 100			
**"density" indicator is utilized when no "freezing point" indicator is available				

The main question is: how much of the milk meets these standards and what needs to be done to improve milk quality? A few large farms reach international and Azeri „Extra Class“ standard. The large majority of milk producers (99%) does not even come close to these standards. Bacteria count exceeds 10 million, SCC is not measured, and it is unlikely that freezing points (or density) meet standards as adding water is a common habit.

3. Present Testing and Quality Control Programs

Each dairy has its own approach to milk collection and quality control, but the most common system is as follows:

Step 1: A milk collector/trader goes from farm to farm to collect the milk. In summer twice per day and in winter only once per day (as both quantities and outside temperatures are much lower). His milk acceptance depends on organoleptic testing (smell, visual appearance and taste). In some cases the milk collector also checks the milk on added water (use of Atago refractometer). In most cases milk is accepted unless there is a strong reason for doubt. Adding water or acidity (in summer) are the main reasons for rejection at farm gate.



Milk is highly perishable, so dairy plants try to have the milk cooled down within 2 hours after milking. With the present system that is not an easy task. Milk collection often takes more than 2 -3 hours before it can be delivered to an MCC with cooling facilities. Especially in summer losses are higher. The quantity of milk delivered per household average 4-5 liter/time. This makes milk collection a slow and costly process. It also has the disadvantage that quality control is very limited (as milk is collected at farm gate and not brought to a collection point).

Step 2: At the MCCs the milk delivered by the collectors/traders is tested for acceptance and payment purposes. Main criteria here are:

- Composition (officially at least 3,4% fat, in practice milk wit <3% is also accepted)
- Alcohol test (alcohol 72-74%)
- Acidity (pH 6,6 or titration)

Most MCCs have a small Bulgarian made milkoscan that can test for fat, protein, solids, lactose and added water. The problem is that there is no service organization to ensure proper maintenance and calibration. The reliability of the testers is questionable (but the price is much lower than a milkoscan produced by Foss or Delta Instruments). At the MCCs samples are taken for testing at the dairy plant.

Step 3: At the dairy plants the bulk milk is tested again on composition and biological quality. Tests that are performed are similar to those at the MCC.

Even with the additional testing at MCC level, most of the milk is still accepted. Only when there is a strong indication that the collector (or farmer if he can be traced) is manipulating the quality, milk is rejected.

Milk collected from large farms (of which there are a limited number) is easier to test and the quality is better. In this case the recommended quality control program as mentioned in the Azeri Standards could well be applied.

4. Present Payment Systems

The basis of the price for raw milk is fat content. Here there are differences between dairy plants, but an indicative system for milk collected from households is:

Collectors' fee	Fat%	3.0 – 3.4 = 0.04 AZN 3.5 – 3.8 = 0.05 AZN > 3.8 = 0.06 AZN
Farmers' price	Fat% (winter)	3.3 – 3.5 = 0.31 AZN > 3.5 = 0.32 AZN (winter)

TS is not (always) used for payment, as the correlation between fat, lactose and protein is said to be very similar for most farmers („as feed is always the same for the cows, there is little variation in composition“). Therefore fat level is considered enough indication. Large farms receive a (substantially) higher price than smaller ones.

According to Zeki Ashchi raw milk prices have increased substantially over the past few years (from 0.20 – 0.23 in 2008 to 0.32-0.37 in 2011). There is a strong variation in summer and winter prices (0.10 AZN difference). There is also a large difference in farm gate price and factory gate price as there are both fees for collectors and MCC managers, plus costs for transport, testing and handling.

Milk with < 3% fat will get a deduction on milk price (based on the % of added water), rest of farmers in principle all get the same price. This provides no incentive to improve quality or composition.

6 Recommendations on Milk Acceptance Criteria and Incentives

The task to improve milk quality is not easy as we are dealing with a very large number of suppliers and very small quantities of milk per supplier.

In principle milk should be offered:

- In a stainless steel or aluminum milk can, which
- Has been properly cleaned and is
- Covered with a lid (and not with plastic or rubber)

If we calculate the number of small milk cans (10 l) needed, we talk about substantial investments. Households are already complaining about the milk price (the inefficient system of production and high feed prices increase their cost) and will not be eager to invest in new cans unless there is an incentive (more money for better quality).

The simplest way is to pay more attention to cleaning. ACT can support with the production of information material (leaflets and posters), while the milk collectors should pay extra attention to cleanliness.

As testing at farm level remains difficult, rejection of milk should take place at the MCCs if the following minimum standards are not reached:

- Organoleptic quality: smell, visual appearance and taste normal
- Freshness: passing the 75% alcohol test
- Temperature: between 30 and 34 °C
- Added water: refractometer reading of < 5% added water
- Density: > 1.020 kg/l at 30°C
- Inhibitors/antibiotics: should be reported and will be kept separately.

Sampling for payment purposes:

Payment should be based on composition and quality. As this cannot be done on an individual basis, the payment system has to be based on payment groups. Milk is often collected in the large blue milk cans and from each blue can a sample can be taken as the basis for payment to the farmers that supplied the milk in that can.

The composition of each can be determined (lactoscan readings give fat, protein, lactose and solids). Each dairy can decide its own payment system, but agree on minimum standards for composition. Milk not reaching the minimum standards for composition will be penalized (as milk has already been accepted). Feedback will be given by the collector to the farmers who supplied the milk, with the warning that if next deliveries do not reach the proper standard the milk will be returned to them.

If the number of farmers in one group is not too large, the collector can organize a group meeting and thus stimulate social control within the group.

At the MCC milk can also be tested on freezing point (calculated FP with the lactoscan). A penalty/bonus system can be introduced for Freezing Point (FP < 0,500 °C gets a penalty, milk with a FP > 0,520 °C receives a bonus). Thus adding water would have a negative effect on milk price.

Bacteria counts would be a next step for testing and use in a bonus/penalty system. TPC (total plate counts) are reliable, but time consuming. Practical indicators are the Resazurin or Methylene Blue tests (cheap and fast).

Too many changes in a short time will cause resistance from farmers and collectors. A gradual improvement in quality control systems is necessary. We also must make sure that at least 60% of the farmers can reach the minimum standard. Once we reach 80%, the standard can be set a little higher.

APPENDIX 3

**PPT Presentation on Feeding
Management Tables Related to Ration
Calculation Feeding Values**

Guideline for Dairy Farm Evaluation

**Body Condition Scoring List of
Participants Evaluation Forms**

**PPT Presentation on Feeding Management to be inserted
(handout 10 pages)**

Ration Calculation - Basic Information

Daily nutrient requirements of lactating and pregnant cows

	Net Energy Of Lactation (Mcal NEL)	Crude Protein (g)	Minerals Calcium (g)	Phosphorus (g)	Vitamins A (1000 IU)	D
Maintenance for mature lactating cows						
Body weight						
450	7.82	341	18	13	34	14
500	8.46	364	20	14	38	15
550	9.09	386	22	16	42	17
600	9.70	406	24	17	46	18
Maintenance plus last two month of gestation						
450	10.16	973	30	18	34	14
500	11.00	1054	33	20	38	15
550	11.81	1131	36	22	42	17
600	12.61	1207	39	24	46	18
Nutrient required by kg of milk of different fat percentages						
% fat in milk						
3.5	0.69	84	2.97	1.83	--	--
4.0	0.74	90	3.21	1.98	--	--
4.5	0.78	96	3.45	3.13	--	--

Daily dry matter intake (DMI) of dairy cows (calculated from NRC, 1989).

Milk yield kg/d	Body weight, kg			
	400	500	600	700
Dry matter intake of non-pregnant cows at maintenance, kg/d				
	5.7	6.8	7.8	8.7
Dry matter intake of pregnant cows during the dry period, kg/d				
	7.4	8.8	10.1	11.3
Dry matter intake of lactating cow in mid- and late lactation, kg/d ¹				
2	7.0	8.1	8.9	10.0
4	8.2	9.2	9.9	11.0
6	9.4	10.3	10.9	12.0
8	10.5	11.4	12.0	12.9
10	11.7	12.5	13.0	13.9
12	12.6	13.3	13.9	14.7
14	13.5	14.2	14.7	15.5
16	14.3	15.0	15.5	16.2
18	15.1	15.8	16.2	17.0
20	15.9	16.6	17.0	17.7
22	16.6	17.3	17.7	18.4
24	17.3	18.1	18.5	19.1
26	18.0	18.8	19.2	19.8
28	18.7	19.4	19.8	20.5
30	19.3	20.1	20.5	21.1

¹In early lactation, intake may be reduced by as much as 18%.

Ration Formulation - Example

Composition of the feeds used in the example of ration balancing

	Dry Matter (% of as fed)	Energy Mcal NEL	Protein (% of DM)	Ca (% of DM)	P (% of DM)
Alfalfa hay, full bloom	86	1.20	15.0	1.25	0.22
Natural grass hay, mature	86	1.10	5.5	0.37	0.23
Forage ¹	86	1.15	10.3	0.81	0.23
Soybean meal	87	1.80	46.9	0.38	0.72
Wheat bran	88	1.60	17.1	0.13	1.38
Barley grain	88	1.90	13.5	0.05	0.15

¹ Forage composition is calculated as 0.5 x Alfalfa + 0.5 x Natural grass. The cow will eat 2% of its body weight DM from forage.

Calculation of nutrient requirements (forage and other feeds and calculation of concentrate mix

	Line #		Energy Mcal NEL	Protein ¹ (g)	Calcium (g)	Phosphorus (g)
--	--------	--	--------------------	-----------------------------	----------------	-------------------

Step 1: Requirements

Maintenance (body weight)	(1)	500	8.46	364	20.00	14.00
per kg of milk at 4% fat		1	0.74	90	3.21	1.98
For 18 kg of milk at 4% fat	(2)	18	13.32	1620	57.78	35.64
Weight gain mid lactation	(3)		0	0	0	0

Total	(4) = 1+2+3		21.78	1984	77.78	49.64
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Step 2: Supply from forage (2% body weight)

Supply:	(5)	10	11.50	1030	81.00	23.00
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Step 3: Nutrients required in the concentrate mix

In the concentrate mix	(6) = 4-5		10.28	954	-3.22	26.64
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Step 4: Amount of concentrate mix needed: based on an average of 1.7 Mcal/kg NEL DM. This means that for 10.28 Mcal NEL, 6 kg concentrate will be needed (10.28/1.7)

Step 5: Percentages of CP, Ca and P in the concentrate mix:

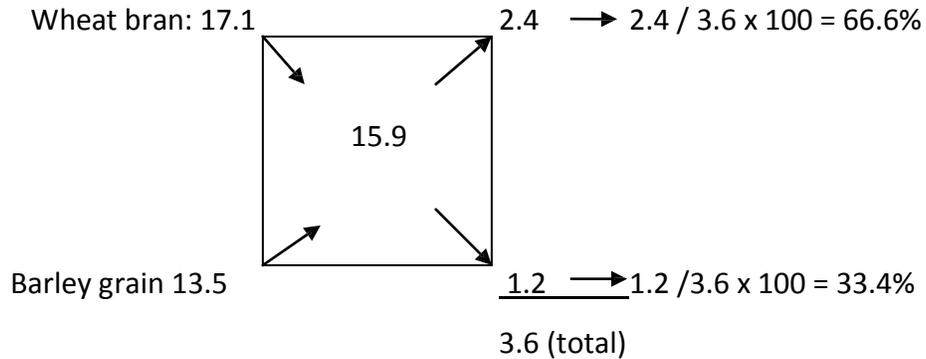
Protein: 954 grams in 6 kg = 159 grams in 1 kg = 15.9%

Calcium: 0 grams in 6 kg = 0 grams in 1 kg = 0%

Phosphorus: 26.64 grams in 6 kg = 4.4 grams in 1 kg = 0.44%

The Pearson Square

Protein percentage needed =15.9



- 1) Write the desired percentage of the nutrient in the center of the square.
- 2) Write the percentage of the nutrient in the two feeds in the upper and lower left corner of the square.
- 3) Subtract diagonally and write the results in the upper and lower corners. The value in the upper right corner of the square (6.7) is the number of parts of the feed in the upper left corner (rice bran). Similarly, the value in the lower right corner of the square (1.8) corresponds to the parts of the feed of the lower left corner (coconut meal).
- 4) For each feed ingredient, divide the number of parts by the total number of parts and multiply by 100 to convert parts into percentages.

Step 6: Calculation of the protein rich feeds in the concentrate mix

Feed in mix	% of feed in the mix ¹	Amount of feed (kg)	
		for a 100 kg mix	for a 6 kg mix
Wheat bran	66.6%	66.6	4
Barley grain	33.4%	33.4	2

Step 7: Calculate the calcium and phosphorus: calculate the quantity supplied through the concentrate mix and add calcium of phosphorus as required.

Step 8: Conversion of from DM to an as-fed basis and drinking water requirements.

	Amount of DM (kg)	DM (%)	Calculation	Amount as-fed (kg)
Alfalfa hay	5.0	86	$5.0 \times 100/86$	5.8
Natural grass hay	5.0	86	$5.0 \times 100/86$	5.8
Wheat bran	4.0	88	$4.0 \times 100/88$	4.6
Barley grain	2.0	88	$2.0 \times 100/88$	2.3
Total	16.0 kg	(= 3.2% of the body weight)		
<u>Drinking water</u>			16 x 4	64

Step 9: Check the acceptability of the total dry matter intake.

In our example the total DMI is 16 kg/day. The predicted DMI as given in „Daily dry matter intake of dairy cows“ shows that 15.8 kg DMI can be expected for a 500 kg cow, producing 18 liters of milk per day. Our cow should be able to consume everything it needs.

Keep in mind that concentrate feeding will reduce forage intake (0.3 kg per kg concentrate)

Further Recommendations

Concentration of Nutrients in the Ration (energy, protein and macro minerals)

Cow Weight (kg)	Fat (%)	Weight gain (kg/day)	Milk Yield (kg/day)				Early lactation (wk 0 to 3)	Dry pregnant cows
			10	20	30	40		
600	4.0	0.330						
NEL, Mcal/kg DM in ration			1.42	1.52	1.62	1.72	1.67	1.25
Crude protein, % of DM in ration			12.0	15.0	16.0	17.0	19.0	12.0
Macro Minerals, % of DM in ration:								
Calcium			0.43	0.51	0.58	0.64	0.77	0.39
Phosphorus			0.28	0.33	0.37	0.41	0.48	0.24
Magnesium			0.20	0.20	0.20	0.25	0.25	0.16
Potassium			0.90	0.90	0.90	1.00	1.00	0.65
Sodium			0.18	0.18	0.18	0.18	0.18	0.10
Chlorine			0.25	0.25	0.25	0.25	0.25	0.20
Sulfur			0.20	0.20	0.20	0.20	0.25	0.16

Recommended concentrations of trace minerals in the DM of cow rations

Trace minerals	Concentration in ration DM (ppm = mg/kg)
Iron	50.0
Cobalt	0.1
Copper ¹	10.0
Manganese	40.0
Zinc	40.0
Iodine	0.6
Selenium	0.3

¹ Copper requirement is influenced by the molybdenum and sulfur in the diet

Recommended concentrations of vitamins in the DM of cow rations

Vitamin	Concentration in ration DM		
	Lactating cows	Early lactation (wk 0 – 3)	Dry pregnant cows
A, IU/kg	3,200	4,000	4,000
D, IU/kg	1,000	1,000	1,200
E, IU/kg	15	15	15

Feed Composition Table	Values per kg/DM						Price AZN/kg (product)
	DM (%)	TDN (%)	NEL (Mcal/kg)	CP (%)	Ca (%)	P (%)	
Alfalfa hay, early vegetative	90	67.5	1.5	23.0	1.80	0.35	0,04
Alfalfa hay, late vegetative	90	63.9	1.4	20.0	1.54	0.29	0,04
Alfalfa hay, early bloom	90	60.8	1.4	18.0	1.41	0.22	0,05
Alfalfa hay, mid bloom	90	58.5	1.3	17.0	1.41	0.24	0,04
Alfalfa hay, full bloom	90	55.4	1.2	15.0	1.25	0.22	0,03
Natural grass, mature	24	54.0	1.2	6.2	0.37	0.23	0,02
Natural grass, young	20	58.5	1.3	10.2	0.22	0.13	0,03
Natural grass, hay, mature	86	49.5	1.1	5.5	--	--	0,02
Corn, silage	33	72.0	1.6	8.1	0.23	0.22	x
Ryegrass, italian, hay, early vegetative	89	69.8	1.6	15.2	--	--	
Ryegrass, italian, hay, late vegetative	86	63.0	1.4	10.3	0.62	0.34	
Ryegrass, italian, hay, early bloom	83	54.0	1.2	5.5	--	--	
Oats, hay dough stage	90	53.1	1.2	11.5	--	--	0,04
Cabbage leaves	10	76.5	1.7	21.5	0.60	0.72	
Carrot leaves	16	53.9	1.2	19.2	1.37	0.46	
Soybean straw	88	43.7	1.0	5.2	--	--	
Cereal straws	90	42.8	1.0	3.50	--	--	
Corn stover	31	54.0	1.2	5.9	1.24	0.23	
Corn cob	90	49.5	1.1	3.2	0.12	0.04	
Leaves and crown of sugar beets	22	49.5	1.1	13.4	--	--	
Corn grain ground	88	88.2	2.0	10.0	0.03	0.29	0,6
Wheat grain	89	91.8	2.0	16.0	0.04	0.42	0,35
Oats grain	89	79.7	1.8	13.3	0.07	0.38	
Barley grain	88	87.3	1.9	13.5	0.05	0.15	0,3
Rye grain	88	87.3	1.9	13.8	0.07	0.37	
Brewers grain, wet	21	75.4	1.5	28.1	0.33	0.55	
Distillers grain	88	62.0	1.4	11.5	3.20	0.90	
Bakery waste	92	89.0	2.0	10.7	0.14	0.26	
Wheat bran	88	72.0	1.6	17.1	0.13	1.38	0,2
Wheat bran AIM	85	49.5	1.1	8.5	--	--	
Barley grain AIM	87	58.5	1.3	9.1	--	--	
Beet, fodder, red, fresh	13	83.7	1.9	12.5	--	--	
Beet, sugar, fresh	20	88.2	2.0	8.6	--	--	
Beet, sugar, pulp dehydr.	91	80.6	1.8	9.7	0.69	0.10	
Soybean meal	88	83.2	1.8	46.9	0.38	0.72	
Sunflower seed cake	90	43.2	1.0	25.9	0.23	1.03	0,6
Cotton seed	90	100.4	2.2	25.0	0.12	0.54	0,5
Brewers grain, wet	21	75.4	1.5	28.1	0.33	0.55	
Distillers grain	88	62.0	1.4	11.5	3.20	0.90	
Bakery waste	92	89.0	2.0	10.7	0.14	0.26	
Compound feed Golden Feed I	90	76.5	1.7	15.2	--	--	0,4
Compound feed Golden Feed IIIa	90	54.0	1.2	11.7	--	--	0.35
Conversion rate:				45			
1 Mcal = 4,18 MJ							

Guideline for Dairy Farm Evaluation and Technical Advice

A. General (barn) inspection

Upon entering the barn:

- Current barn climatic conditions, e.g. temperature, humidity, drafts and air quality
- Presence and use of ventilation system to deal with seasonal extremes of weather
- Artificial and natural sources of light
- Restraining facilities (loose housing)

When standing in front of the cows:

- Estimation of quality of feedstuffs provided
- Availability of fresh roughage or total mixed ration (TMR)
- Source and cleanliness of drinking water
- General cow attitude, e.g. dull or alert
- Prevalence of cow identification
- Ocular or nasal discharge?

When standing behind the cows:

- General inspection of body condition and rumen fill
- Cleanliness of the cows and their environment
- Skin and hair condition
- Vaginal discharges
- Consistency and color of feces
- Presence of lame cows
- Bedding use and stall hygiene
- Floor type, condition and maintenance level
- Type of manure handling system

Further inspection of the facilities:

- Young stock housing facilities
- Young stock size and general condition
- General state of repair/maintenance of the barn
- Presence and condition of calving area and sick cow housing

B. Daily Schedule and Activity Patterns

Determine the daily routines for:

- Feeding (how long are cows without feed, selection of feed, competition for feed)

- Milking
- Cow observation (estrus and health)
- Cleaning

C. Milking and Milk Handling

- Milking facilities and cleanliness milking equipment
- Use of water, towels, buckets, teat dips
- Cow preparation (wet or dry)
- Time between cow preparation and milking
- Preferably direct observation during milking

D. Feeding Program

- Examination of the feed and estimation of forage quality
- Feed storage facilities
- Details of feeding program (what, how much and when)
- How is the feed quantity measured
- Any leftovers after feeding?
- Is the feed produced on the farm or purchased (and at what price)
- Are rations made according to production and feed requirements

E. Manure Handling

- Manure handling in immediate environment of the cow
- Manure handling on the farm (storage and use, leaching in groundwater)

F. Pasture Management

- Length of grass in the current pasture
- Botanical composition of the pasture
- Appearance of finished and to be used plots
- Length of time in the same plot, related to number of animals
- Walking distance to the pasture and condition of paths
- Presence of shade if necessary
- Access to and quality of drinking water
- Fodder conservation: quality and quantity

JB
14-05-201

Body Condition Score

-a brief guide-

Why do you score?

Ration calculation is one of the methods to be used in animal nutrition, but is based on an estimated dry matter intake (DMI) for the herd. The DMI per day varies greatly among cows, due to variations in age, stage of lactation, body condition and genetic potential. Metabolic diseases - like fatty liver syndrome, milk fever and ketosis- also influence the DMI per day. Regular scoring helps to maintain the optimum condition throughout the lactation cycle, resulting in healthier cows that produce more milk.

Fatty liver can occur shortly before and after calving, during what has been termed “transition period.” When faced with a reduction in intake, a cow mobilizes body fat, which increases both the concentration of circulating fatty acids and the fat deposits in the liver.

Cows should end their lactation in the body condition that would be desirable at calving (e.g. 3.5) to avoid the need to add weight during the dry-off period. Body condition in excess of 3.5 to 3.75 during the dry period can lead to increased incidences of fat cow syndrome and fatty livers at calving, compared with condition gained during lactation. On the other hand, underfeeding dry cows, either to make them lose excessive weight and/or as a result of feeding low quality forages or feed restriction, can lead to body fat mobilization and increase incidence of ketosis.

Dry cows with body condition of 3 or less can be fed more energy in the diet to improve their condition with less risk of fatty liver. The risk is less because the liver does not deposit fat while in positive energy balance. On the other hand, the efficiency of depositing energy is greater while in lactation, so it is more important both to achieve a desired body condition before dry-off and to maintain the body condition from then through calving.

Over-conditioned cows should not be “feed restricted,” as fat would be mobilized which will increase circulating fatty acids and, in turn, increase fat deposits in the liver. Fatty liver is also associated with increased incidences and severity of laminitis, mastitis, milk fever, retained placenta, and metritis. In the long term, increased liver fat concentrations are associated with decreased reproductive success and decreased milk production in dairy cows.

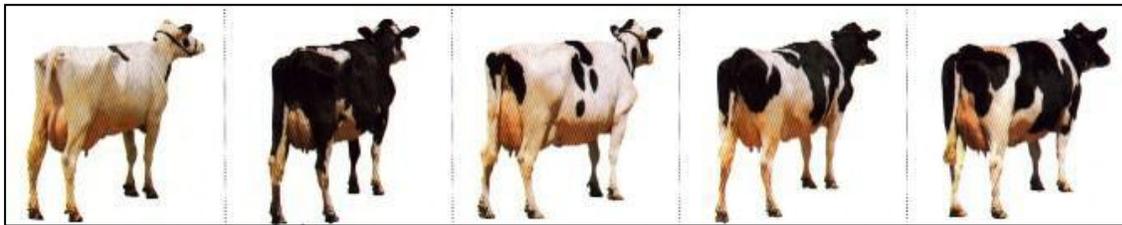
With high feed prices, a logical approach is to take a closer look at the efficiency of feed utilization (with the implication being that less feed may be used by an animal to produce the same amount of product).

Early in lactation, feed efficiency for milk production is artificially high (2.4) and results from a low initial feed intake paired with body fat mobilization. As a result, once feed intake starts to increase, in the first two months of lactation, the feed efficiency for milk production sharply decreases (hand-in-hand with increased feed intake); and feed efficiency continues to decrease through the remainder of the lactation. After the 8 week of lactation, the energy supplied by the feed tends to match that required for milk production. At this time, the cow starts to gain condition, whereas feed efficiency for milk production continues to drop steadily.

What do you score?

Body condition scoring is a subjective method for estimating the quantity of fat on a live animal. The muscularity of a cow is rather a matter of genetic potential. The quantity of fat tissue is more a result of feeding practices.

The scoring system is based on a scale from 1 to 5, whereby differences are indicated with 0.5 point. A score of 1 indicates severe under conditioning and a score of 5 is assigned to very obese cows.



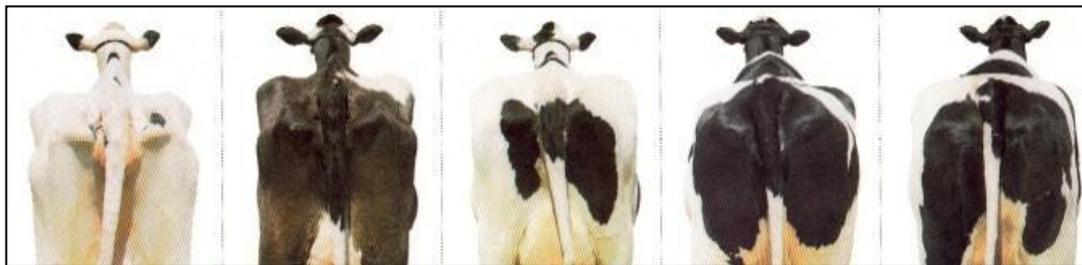
Score: 1

2

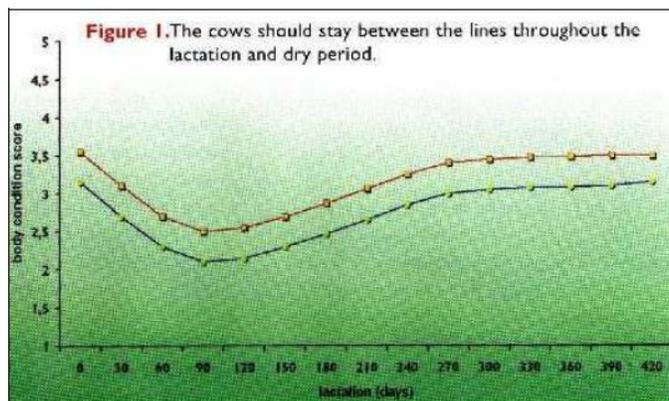
3

4

5

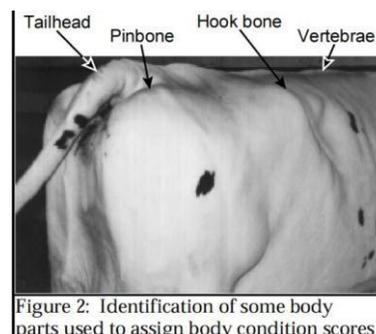


The desired condition cycle of a milk cow during lactation is shown in Figure 1. It should be attempted through correct feeding to keep the scores within the two lines.



How do you score

- When scoring no attention is paid to size and type of animal, lactation stage, production level and health condition.
- The animals should stand square and flat, preferably tied up.
- Stand behind the cows when scoring.
- Score the fat deposits of the pin holes (tail head area) and the fat and muscularity of the pin bones and use this as starting point.
- Then score fat and muscles of the lumbar vertebra. Does this fit with the fat deposit of the tail head, than the score is determined. If it is less in comparison to the tail head then the score can be reduced by half a point (0.5). If it is more, than the score can be increased by half a point.



Body Scores



Body condition score 1.
Deep cavity around tailhead. Bones of pelvis and short ribs sharp and easily felt. No fatty tissue in pelvic or loin area. Deep depression in loin.



Body condition score 2.
Shallow cavity around tailhead with some fatty tissue lining it and covering pin bones. Pelvis easily felt. Ends of short ribs feel rounded and upper surfaces can be felt with slight pressure. Depression visible in loin area.



Body condition score 3.
No cavity around tailhead and fatty tissue easily felt over whole area. Pelvis can be felt with slight pressure. Thick layer of tissue covering top of short ribs which can still be felt with pressure. Slight depression in loin area.



Body condition score 4.
Folds of fatty tissue are seen around tailhead with patches of fat covering pin bones. Pelvis can be felt with firm pressure. Short ribs can no longer be felt. No depression in loin area.



Body condition score 5.
Tailhead is buried in thick layer of fatty tissue. Pelvic bones cannot be felt even with firm pressure. Short ribs covered with thick layer of fatty tissue.

(Images: Craig Johnson, Elanco Products Co.)

In short:

- First judge the filling of the pin holes (the area around the tail head) and the covering of the pin bones and lumbar vertebra.
- The dorsal vertebra, the hipbone and the ribs are judged as secondary parameters.
- The first impression is by visual appearance, after which by feeling (palpating) the area around the tail head and possibly the lumbar vertebra the final score is determined.
- The scores should be made of all animals: cows in milk, dry cows and pregnant heifers.

Score	Pin holes	Hip & pin bones	Lumbar vertebra	Dorsal vertebra & ribs
1	deep	sharply marked	sharp and clearly visible	sharply marked
2	shallow	marked	visible	clearly palpable
3	rounded *	rounded	palpable	still palpable
4	filled	still palpable	hardly palpable	rounded
5	stark filled	hardly palpable	covered with fat tissue	invisible, fat covered

* moderately filled

Note: Always use the same hand and record the scores!

When to score

At regular intervals of about one month. The condition score, the production level and the fat/protein percentages can be used to judge the feeding strategy. Based on this judgement the ration and/or concentrate supply can be adjusted.

Registration scores

The individual scores, together with the calving dates can be entered on a special scoring list. It is also possible to make group averages for cows of, say 0-100, 100-200 and >200 days in lactation, dry cows and pregnant heifers. A graph gives an easy visible presentation of the cycle. If too many animals are outside the desired cycle the reasons should be analysed and adjustments made.



AZERBAIJAN COMPETITIVENESS AND TRADE (ACT) PROJECT

**List of the participants for the training
on Feeding Management
conducted by ACT**

Date: 24-25 May, 2011

Trainers: John Bonnier, Allen Young

Venue: AIM - Agjabeli office

VCs: Elnur Sofiyev

No	Name	Organization and position	Contact phone and email	Signature
1	Allahverdiyev Ismayil	Atena milk plant. Zoo engineer		
2	Aslanov Hesən	Atena milk plant. Zoo engineer		
3	Veliyev Garay	Veterinary	368-78-90	<i>[Signature]</i>
4	Huseynov Shakir	Veterinary	051-928-02-86	<i>[Signature]</i>
5	Guliyev Vaqif	AI specialist	050.384.40.55	<i>[Signature]</i>
6	Mehtiyev Rehman	AI specialist	050-321-19-71	<i>[Signature]</i>
7	Huseynova Ghinnaz	Trainer	050-357-91-65	<i>[Signature]</i>
8	Mikayilov Elchin	Farmer	0152.61-1.07	<i>[Signature]</i>
9	Abbasov Aghamir	Veterinary	050-5404469	<i>[Signature]</i>
10	Abbasov Vahid	AI specialist		
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13	Salmanov Eldar	Veterinary	050-541-4953	<i>[Signature]</i>
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15	Həliyözələn İsmayil	Head trainer	050 46 76 32	<i>[Signature]</i>
16	Cəfərov Rəzil	Director AIM	050 227-46-32	<i>[Signature]</i>
17	Eldəniz Əhmədov	PIU - Mark. Coord	050-363-85-28	<i>[Signature]</i>
18	Kərayyem İsmayil	PIU - ZRR Coord	055.245 7700	<i>[Signature]</i>
19	İlkin İbrahimov	AIM-HEKS P.Han.	050-517-30-16	<i>[Signature]</i>
20	Səfiyə Əlman	M/E office	050 442 01 81	<i>[Signature]</i>
21	Hüseyn Əliyev	Təşkilatçı, su və yem tədarükçüsü	050 568 5204	<i>[Signature]</i>
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AZERBAIJAN COMPETITIVENESS AND TRADE (ACT) PROJECT

**List of the participants for the training
on Feeding Management
conducted by ACT**

Date: 02-03 June, 2011

Trainers: John Bonnier,

Venue: JAC - Lankaran office

VCs: Elnur Sofiyev

№	Name	Organization and position	Contact phone and email	Signature	
				02 June	03 June
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8	Vidadi Malikov	Fermer, Lankaran city, Sattarkhan str.	0504511484	<i>[Signature]</i>	<i>[Signature]</i>
9	Nasirov Nizami	Fermer, Astara city	0506653545	<i>[Signature]</i>	<i>[Signature]</i>
10	Sehran Abishov	Fermer, Astara city	0518475651	<i>[Signature]</i>	<i>[Signature]</i>
11	Aliyev Nicat	Farmer, Lankaran region, Liman city	0519621098		
12	Murad Abilov	Pal Sud LLC, Lankaran city	0505191039		
13	Taleh Akbarov	Farmer, Lankaran city	0503895582		
14	Agayev Sofiyat	(PAL-SUD)	0709424855	<i>[Signature]</i>	<i>[Signature]</i>
15	Bolomonov Hisespanig	Bilwaar-Agja	0703668642	<i>[Signature]</i>	<i>[Signature]</i>
16	Hasanov İlqar				
17	Muradov Sahib	fermer	050-309-36-42	<i>[Signature]</i>	<i>[Signature]</i>
18	Shayev Nskm	Lankaran. Bl. n.	050-434-52-67	<i>[Signature]</i>	<i>[Signature]</i>
19	Penjaliyev	COBI Poladov	0506657757	<i>[Signature]</i>	<i>[Signature]</i>
20	Fayziyev I	Fayzi Sahitov	0504584203	<i>[Signature]</i>	<i>[Signature]</i>

- 21. Zhiyev Ismayil bayr 0518652147 *[Signature]*
- 22. Hasanov Elnur fermer 070-614-15-02 *[Signature]*
- 23. Bayev Samir Seyidova 050-546-41-50 *[Signature]*
- 24. Fermerov Sabir Zahir 0504906400 *[Signature]*



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AZERBAIJAN COMPETITIVENESS AND TRADE (ACT) PROJECT

TRAINING EVALUATION FORM

“Feed management”

24-25 May, 2011

Agcabedi region, AIM office

Trainer: John Bonnier

For each of the following areas, please indicate your reaction: *Form was filled by 13 participants.*

Content:	Excellent	Good	Needs Improvement	Not Applicable
Covered Useful Material	(9)	(4)	(0)	(0)
Practical to My Needs	(7)	(6)	(0)	(0)
Well Organized	(11)	(2)	(1)	(0)
Presented at the Right Level	(5)	(6)	(1)	(0)
Effective Activities	(4)	(8)	(1)	(0)
Useful Visual Aids and Handouts	(7)	(5)	(1)	(0)
Presentation:				
Instructor’s Knowledge	(10)	(3)	()	()
Instructor’s Presentation Style	(7)	(5)	()	()
Instructor Covered Material Clearly	(5)	(8)	()	()
Instructor Responded Well to Questions	(6)	(7)	()	()

How could this workshop be improved? *It needs organize group activities till afternoon, because all participants tired after afternoon. Need additional time to learn better.*

Any other comments or suggestions? *It will be better if there more information about feed contents and energy. Such kind of training must be often organized. Training was good*

Overall, how would you evaluate this workshop training session?

1. Excellent 6 Good 5 Fair 2 Poor 0



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AZERBAIJAN COMPETITIVENESS AND TRADE (ACT) PROJECT

TRAINING EVALUATION FORM

“Feed management”

02-03 June, 2011

Lankaran region, JAC office

Trainer: John Bonnier

For each of the following areas, please indicate your reaction: *Forms were filled by 14 participants.*

Content:	Excellent	Good	Needs Improvement	Not Applicable
Covered Useful Material	(8)	(6)	()	()
Practical to My Needs	(3)	(6)	(2)	(1)
Well Organized	(9)	(5)	()	()
Presented at the Right Level	(8)	(3)	(2)	()
Effective Activities	(9)	(3)	()	()
Useful Visual Aids And Handouts	(3)	(8)	(1)	()
Presentation:				
Instructor’s Knowledge	(10)	(4)	()	()
Instructor’s Presentation Style	(11)	(1)	()	(1)
Instructor Covered Material Clearly	(9)	(3)	(2)	()
Instructor Responded Well to Questions	(11)	(3)	()	()

How could this workshop be improved? *It must be more practice*

Any other comments or suggestions? *Such kind of training must be often organized. It will be better to use from visual aids. Training was good*

Overall, how would you evaluate this workshop training session?

1. Excellent 7 Good 4 Fair Poor

APPENDIX 4

Draft Outline for Survey on Artificial Insemination

Survey on AI Services

1. Purpose

The development of AI services is essential to increase the genetic potential for milk (and meat) production of the local cattle. With the development of milk collection areas, the demand for AI services is expected to increase. The purpose of this survey is to:

- identify the villages where milk is collected by the formal dairy plants AI services are provided,
- assess the quality of these services based on farmers satisfaction and where possible on conception rates in relation to 1st inseminations,
- identify villages that would benefit from AI services and where such services can be economically justified.

2. Scope

The survey will cover all villages in the rayonswhere milk is collected by the dairy companies

3. Approach

- the list of villages to be covered by the survey will be obtained from the dairy plants mentioned above,
- for each village the number of suppliers and total milk quantity day (summer and winter) will be recorded (to be provided by dairy plants), through the veterinary department and/or milk collectors the villages where AI services are provided are identified,
- in those villages where AI services take place, the name of the inseminator, the number of (1st) inseminations and conception rates will be recorded (total 2010). These data to be obtained from relevant livestock departments and/or directly from the inseminators,
- interviews with farmers in at least 15 villages (covered by different inseminators) will provide information on farmers understanding of AI, their satisfaction with the AI services and issues related to animal breeding that should be given more consideration in those villages where milk is collected, but that do not have AI services information will be collected on demand for these services and if the number of breedable animals justifies investments in AI services,
- finally potential service providers (e.g. local vets, leading farmers) will be identified. This group will form the basis from which candidates for training on artificial insemination and further support.

APPENDIX 5

Indicative Training Program Inseminators

Program A.I. Training Course

Day	08.00 – 09.30	10.00 – 12.00	14.15 – 16.45
Sunday			Arrival of trainees
Monday	Introduction	Theory:	Practical:
	- possibilities and limitations of AI	- the reproductive tract of a cow	- the use of deep frozen semen packed in French straws
	- needs for a successful AI program	- the oestrus cycle of a cow	
		- heat detection	
		- time of insemination	
Tuesday	Practical:	Theory:	Practical:
	- insemination technique on live animals	- AI and breeding programmes	- insemination technique on live animals
		- measuring reproductive performance	
		- causes of low reproduction	
Wednesday	Practical:	Theory:	Practical:
	- insemination technique on live animals	- major reproductive diseases	- insemination technique on live animals
Thursday	Practical:	Theory:	Practical:
	- insemination technique on live animals	- recording in an AI service	- insemination technique on live animals
		- individual registration of cattle	
		- identification of cattle	
Friday	Practical:	Theory:	Practical:
	- insemination technique on live animals	- pregnancy diagnosis	- insemination technique on live animals
		- summary of earlier lessons	
Friday	Practical:	Theory:	Practical:
	- insemination technique on live animals	- pregnancy diagnosis	- pregnancy diagnosis on live animals
		- summary of earlier lessons	
Saturday	Examination:	Examination:	
	- practical insemination	- theory reproduction and AI	Departure
		- closing ceremony	

Note: total number of participants 6-8 persons

APPENDIX 6

Handout on Calf Rearing

Calf Rearing

We can divide the first months of a calf's life in two important periods: the colostrum period and immediately following that, the milk period.

The Colostrum Period

Feed first colostrum quickly

A newly born calf cannot do without colostrum. It holds the required antibodies a calf needs to build up its own resistance once it is born. This means that it needs to receive its first colostrum feeding as quickly as possible, or at most within one hour after its birth. There are a number of reasons for the need to feed colostrum so soon:



- ✚ During calving a calf may be infected with a number of pathogens. Colostrum is the best medicine available to fight and neutralize these pathogens.
- ✚ The intestine walls of a newly born calf are completely open. This means that an animal can absorb complete protein molecules via the uterine wall into the bloodstream. This is how a calf receives essential feed ingredients optimally. The intake capacity of immunoglobins through the uterine wall decreases during the first 24 hours from almost 100% right after birth to about 20% one day later. This is due to a decreased pH in the abomasum.
- ✚ The quality of colostrum diminishes quickly after calving. This is also because the colostrum dilutes with each subsequent milking.

How long do we feed colostrum?

Of course things don't stop after the first colostrum has been fed. The question is how long a dairy farmer must or should continue feeding colostrum. The answer to this question is not that simple. Two days of colostrum feeding is the minimum but there is nothing against feeding colostrum for a longer period of time. Some dairy farmers feed colostrum to their calves as long as three or four days. Even though this may not have a very positive effect on the overall resistance mechanism, it does positively influence the resistance at intestine level.

How often do we feed?

The key is to feed as much fresh colostrum as quickly as possible and as often as possible. A healthy abomasum needs 5 hours to digest the first feeding of 1.5 litres. This means that the calf can be fed four times during the first day with five-hour intervals. This is an absolute must in order to make the best use of the open intestine wall. The second and the next couple of days the farmer can stick to this schedule of feeding every five hours.

How much do we feed?

There is quite some discussion about the amount of colostrum. Knowing that the volume of the abomasum of a newly born calf is no bigger than 1.5 litres, a first feeding of 1 to 1.5 litres is desired. Feeding too much colostrum in one time is not good. Feeding more than 1.5 litres may result in the abomasum flooding over and some of the colostrum ending up in the rumen. This may result in digestive disorders.

How fresh should colostrum be?

In order to make the best use of fresh colostrum, fully milk the mother cow right after calving. The earlier this is done, the better. This holds the advantage of having high quality colostrum available for a larger number of feedings, allowing the calf to benefit the most from the first colostrum. Preserving colostrum is a point that needs attention. It should be stored hygienically and in a cool place. In order to prevent the colostrum from spoiling, it is recommended to sour it with fresh buttered milk.

Means of feeding

There are a number of methods for feeding colostrum to a newborn calf, including:

-  teat feeding
-  bucket feeding, and
-  suckling

Teat feeding: This is the most common and also the best method whether it is with a bottle with teat or a bucket with teat. Via the teat feeding method the milk arrives at the place of destination, the abomasum, as naturally as possible. The swallow reflex works optimally with this method while it is also the best means of feeding cold milk.



Bucket feeding: A calf learns to drink from a bucket straight away with this method. There is a chance though that an irregularly drinking calf's swallow reflex doesn't work properly.

Suckling: A dairy farmer may also decide to leave the calf with her dam for a number of days. A commonly heard argument in favor of this method is that the calf will at least drink enough colostrum. This isn't always the case though. Research indicated that many calves don't drink enough colostrum and don't get it soon enough. They don't tend to drink right after calving. Hygiene is another factor. The teats and udder of the cow are not always clean freeing the way for pathogens.



Individual housing during the first 10 days helps to detect health problems quickly and thus ensures that the calf gets the best care.

The Milk Period

During the milk period, other aspects require extra attention:

- feeding milk replacer or whole milk after the colostrum period
- prevention of diarrhea among the calves
- good water availability
- sufficient attention to rumen development
- weaning of the calves

Choose milk replacer

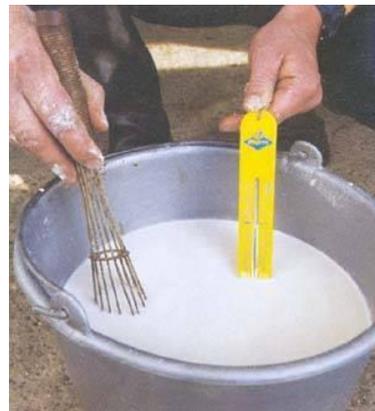
After the colostrum period, which normally lasts three days, the question arises as to which milk product the calf should receive in the coming weeks. A dairy farmer can choose between whole milk and milk replacer. Each product must be considered according to its advantages and disadvantages. In most cases, raising calves on whole milk is simply too expensive. Milk replacer tends to be more financially attractive than whole milk.

Milk replacer not only has a financial advantage. There are also other advantages that support the case for milk replacer. A calf benefits greatly from a consistent composition of milk. With milk replacer, this composition is always constant; on the other hand, the composition of whole milk fluctuates. Whole milk may have a high fat content. This causes an earlier point of filling in the calf. In turn, this leads to a decrease in the intake of dry feed. It is also well-known that

„weaker“ calves regress faster when they are reared on whole milk. In addition, anaemia occurs more often in calves that are raised on whole milk. This is caused by a Fe (iron) shortage.

Temperature

The temperature of the milk is also very important. With whole milk the temperature is always less than 37°C when the milk arrives at the calf. Milk replacer is prepared at a temperature of 45-55°C and fed at 40-42°C. This gives less risk of feed disturbances. Last of all, but surely not the least important argument in the choice for milk replacer is the issue of the transfer of diseases. The best known is Para Tuberculosis, which is generally referred to as Crohn's disease in people. The organisms of this disease may transfer via whole milk from cow to calf. In a severe case, a cow that is a latent carrier of Para TBC is able to infect an entire round of calves.



Deal with diarrhea quickly

A problem that every dairy farmer has to deal with almost every year is the fact that one or

more calves have thin manure. This is frequently a form of diarrhea. On the dairy farm there is a distinction between:

- nutritional diarrhea
- infectious diarrhea

It is commonly known throughout the world that calf diarrhea appears in various forms. This already indicates how difficult it is to make a correct diagnosis at an early stage. Do not wait with treatment, or – even better – take measures to prevent diarrhea.

Practical measures that contribute to the prevention of diarrhea are:

1. Good hygiene throughout the calving process.
2. Ensure that the navel of the newborn calf is disinfected immediately.
3. Ensure that there is an optimum provision of colostrum.
4. Mix milk replacer in the proper way.
5. Feed milk replacer at the correct temperature.
6. Feed at regular intervals.
7. Prevent contamination between calves.
8. Ensure a dry, clean and draft-free bedding area.
9. After use, the pen should be power washed, disinfected, and allowed to dry.

Nutritional diarrhea

Nutritional scours is a form of diarrhea which is often caused by the way in which the calves are fed, in most cases with milk. At the same time, feeding practices are also the solution. Problems can develop with the mixing of the milk replacer, the preparation temperature, the amount, the regularity, etc. At first sight, all of these practices are quite easy to correct, if necessary. However, the real problem is that initially it is difficult to determine whether it is a case of nutritional scours or an infectious form of diarrhea. When the latter is the case, a completely different treatment is required than with nutritional scours. That now is the real problem: “We often don’t know that it is”. Therefore, initially approach every diarrhea problem in the same manner:

- The most important thing is that the calf continues to receive sufficient fluid.
- The best solution is to provide an electrolyte mix to the calf at a minimum of twice per day. The time period (maximum of two days) depends on how the calf responds.
- An electrolyte mix must always be supplied separately without adding milk.

Infectious diarrhea

In contrast with nutritional scours, infectious scours are caused by viruses or bacteria. In order to treat this type well and adequately, it is important to first determine which type of diarrhea is present on the farm. For this, a veterinarian’s advice is necessary. With the assistance of manure or blood samples, he will often be able to determine what type of diarrhea is occurring. But also with this knowledge, it appears that it is not always easy to treat diarrhea. In the field it frequently happens that an “innocent” nutritional scours slowly develops into E-coli diarrhea.

And in order to treat this E-coli diarrhea well, a different and more rigorous approach is required that in the case of nutritional scours.

Type	When	Symptoms	Cause	Details
Nutritional Diarrhea	Week 0-10	- thin manure - drinks well	- mixing - temperature - amount - regularity	Calves that drink the first colostrum of the cow. Occurs frequently.
E-coli	Days 0-5	- quite sick - drinks poorly	- nutritional diarrhea - hutch contamination	Stop giving milk immediately
Rota virus	Days 2-16	- calf is not really sick - often drinks well	- contamination from cow to calf - contamination from calf to calf	Continue to feed milk, but small portions. Add some colostrum to the milk to increase the immunity. Common problem.
Corona virus	Days 2-16	- calf is a lot sicker than with the rota virus	- contamination from cow to calf - contamination from calf to calf	Continue to feed milk, but small portions. Add a little colostrum to the milk.
Cryptosporidia	Days 5-20	- slow - drinks poorly -	- insufficient hygiene around calving - insufficient colostrum fed.	

Sufficient water supply

It is not sufficient to supply milk to the calf during the milk period only. It is not true that the milk that a calf receives provides all liquid needed. Both in the case of supplying milk replacer and whole milk, the calf also needs to have constant access to clean and fresh drinking water. Exact figures about the amount are hard to give.

Research and literature studies indicate that during the milk period the water intake of a calf can vary from two litres during the first week to up to six litres during the week of weaning. Calves that receive milk from a pail with a nipple should not be able to drink water immediately after they have received milk. A waiting period of approximately two hours is necessary. In the meantime the milk can leave the abomasum. If the calf receives water too quickly, that water dilutes the milk in the abomasum. This can lead to feeding disturbances.

Fresh water and calf starter at lib after one week help the calf to grow. Good quality hay can be supplied within two-three weeks after birth.



Stimulate rumen development

At birth, a calf has four stomachs (reticulum, omasum, abomasum and rumen), but there is only one that is active, the abomasum. During the first few days, the digestive system of the calf functions in the same way as that of a single-stomach animal. At the time of birth the reticulum, omasum, and the rumen are not or barely developed when compared to the abomasum. In a newborn calf, the abomasum takes almost 60% of the total stomach volume, while in a mature cow this is reduced to only 8%. The opposite happens with the rumen, which begins with 25% in the newborn calf, but develops to 80% in a mature cow.

Provide concentrates and forage

For a ruminant, in this case the newborn calf, it is rumen as soon as possible. Remember, it is the goal to have a heifer that gives birth at the age of two years and that produces well and efficiently. In order to make this possible, there needs to be sufficient rumen development.

When the calves receive too much milk for too long, less rumen development will take place. This happens because the milk ends up in the abomasum and not the rumen. In order to stimulate the rumen of the young calf, a supply of proper feed is necessary, specifically concentrates and forage. Both have two effects on the development of the rumen. In the first place, the rumen grows because of the forage and/or concentrates. But also, the rumen wall begins to develop, especially due to the growth of the rumen papillae. These rumen papillae ensure that the rumen can absorb the nutrients well. This is very important. When the rumen papillae are insufficiently developed they may have a negative influence on the cow's capacity to digest later on.

The effect of various raising systems on rumen development and rumen weight		
	Weight of the Rumen	Volume of the Rumen
First day	2 grams	1.5 litres
After 13 weeks, raised with only milk	78 grams	7.3 litres
After 13 weeks, raised with milk and hay	195 grams	37 litres
After 13 weeks, raised with milk and calf starter	356 grams	30 litres

During the digestion of feed, acids are released. The most important three are propionate, butyrate, and acetate. Butyrate is known to contain the building blocks for the development of rumen papillae. Butyrate comes available in the digestive processes in the rumen.

Start with 650 grams of growth per day

Do as much as possible to optimize the early growth of a calf. In fact, a calf has to grow as if it were being kept for meat production. This growth is easily achieved when the rumen is well developed, or more specifically, the rumen papillae are well developed. In practice, this means that during the first two months, the calf has to grow by approximately 650 grams per day during the first week and even more during subsequent weeks (see the rearing scheme in Appendix 1). Fattening does not occur when a steady growth schedule is followed, but is mainly a result of extra feeding after a disease. In calves that only receive milk and forage (hay), the development of the rumen and the rumen papillae is very limited.

Calf starter

High quality concentrates are very important for a young calf, but not every type of concentrate is good. Starches and sugars in the concentrate ensure the production of butyrate. Especially starch from cereals contributes to the formation of sufficient butyrate for the stimulation of the rumen wall. For an optimum development of rumen papillae, feeding of some type of muesli, also known as calf starter, is the best for calves. An advantage of the muesli is that once it has arrived in the rumen, it works as a kind of brush over the rumen papillae. This has a stimulating effect.

Concentrate in the form of a pellet has the disadvantage of becoming wet and mushy in the rumen of young calves. This can lead to rumen papillae clinging together. Of course, this has a negative effect on further development. It is better not to use a concentrate that is intended for milking cows. Often this contains quite a lot of fat, which the young



calf is unable to use. A calf needs easily digestible concentrates, preferably concentrates that have a crude protein percentage of 18-19%.

Weaning between week 8 and 10

When the calves are between 8 and 10 weeks old, they are often ready to be weaned. In most cases, a longer milk period will only lead to more rapid fattening and a lower intake of forage and concentrates. At the time of weaning, milk is taken away as an important energy and protein source from the daily ration. Concentrates and forage take over this role, especially the concentrates. It is important to introduce this transition gradually. Slowly but surely decrease the amount of milk, and incrementally increase the amount of high quality and especially palatable concentrates. In the case of a healthy calf this daily portion can increase to 2 kg. This amount of concentrate ensures optimal development of the rumen.

At this age, calves can take in a greater amount of dry matter more easily from concentrates than from forage, and in this way, more energy and protein. Up to the age of 6 months, this developmental process of the rumen continues. The concentrates-forage ratio has to change slowly after this period. Too much concentrates from this time forward can lead to undesirable fattening. The rumen is now ready to process increased amounts of high quality forage. Thus the calf is also able to process sufficient energy and protein from forage in order to continue to grow well.

Weight

A second – but certainly not less important – point of attention at the time of weaning is the weight of the calf. A good guideline is that the weight at the time of weaning needs to be between 12-15% of the weight of a mature cow. If the average weight of the mature cows is, for example, 650 kg, then the weaning weight would be around 80-95 kg. In order to determine this weaning weight, the measurement of the chest circumference is a reliable tool. For the decision to wean, it is important to consider the following points:

- is the calf healthy
- is the calf at least 8 weeks old
- does the calf weigh (at least) 80 kg
- does the calf eat sufficient (1.5 – 2 kg) calf starter per day
- is there clean drinking water available (24 hours per day)

Correlation of chest circumference to weight.	
Chest Circumference in cm	Weight in kg
75	41
80	49
85	58
90	68
100	91
105	104

When a calf scores positively in all of these areas, a calf can complete this period without difficulty. After this, the next period of life begins, in which the quality of the forage plays a very important role.

In summary

Healthy productive two-year-olds cows are the result of optimum management in calf rearing. Very close attention to feeding (milk calf starter, forage), water and weaning is critically important as well as keeping a close eye on diarrhea. It all goes back to the first few months of raising the calf. A dairy farmer has to manage his calves in the exact same way as his milking cows. Careful consideration of data such as growth, weight, amount of feed given, etc. is necessary in order to be able to monitor and evaluate the development of the calves. This pays off. Due to the care and attention given, animals with a high genetic potential are later able to contribute in a significant way to increasing overall farm profitability.

APPENDIX 7

Itinerary

Itinerary J. Bonnier

Date	Overnight Stay	Activity
11/5		Travel Almere-Baku
12/5	Baku	Arrival at 01.30, ACT Office
13/5	Baku	ACT Office, program planning and report editing
14/5	Baku	ACT office: preparation training materials
15/5	Baku	Sunday
16/5	Baku	Preparation training materials, meeting Deep & Young
17/5	Baku	State Veterinary Department (lab), preparation roundtable
18/5	Baku	Invitation roundtable and preparation PPT presentation,
19/5	Ganja	Opening UMID MCC, meeting with Allen Young, USDA
20/5	Baku	Visit Bull station, Norwegian NGO and Golden Feed
21/5	Baku	ACT Office: reporting and additional training material
22/5	Baku	Sunday
23/5	Agjabedi	Preparation training materials, travel to Agjabedi
24/5	Agjabedi	Training AIM (together with Allen Young)
25/5	Baku	Training AIM and visit Feed Lab
26/5	Baku	Trade Mission, final preparation meeting
27/5	Baku	Roundtable Meeting with main Dairy Processors
28/5	Baku	ACT Office: minutes of meeting and reporting
29/5	Baku	Sunday
30/5	Baku	(Public Holiday) ACT Office, work on milk quality standards
31/5	Baku	ACT meeting on trade barriers, adaptation training materials
01/6	Lankaran	ACT Meeting Melani/Ed, travel to Lankaran
02/6	Lankaran	Training JAC, Pal-Sud and B-Agro, meeting Pal-Sud
03/6	Baku	Milk collection, training, farm visit Salyan
04/6	Baku	ACT Office: new handout on calf rearing, reporting
05/6	Baku	Sunday
06/6	Baku	Evaluation of extension materials AIM, visit SVD and Embassy
07/6	Baku	Meetings at USAID (UMID) and Milk-Pro (Quality Standards)
08/6	Gakh	Travel to Shaki (ShakiAgro and Norwegian NGO)
09/6	Gakh	Azeryem Feed Mill, Gilan Dairy Pant Zagatala
10/6	Baku	Gilan Dairy Plant Gebele, Travel to Baku
11/6	Baku	ACT Office: statistical data collection and analysis, reporting
12/6	Baku	Sunday
13/6	Baku	Meetings (Hadji Djamalkhan Farm, Administrative Barriers)
14/6	Baku	ACT Office and Travel to the Netherlands

15-22 Report writing in the Netherlands.