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IMPROVING PASTURE AND FORAGE PRODUCTION

KOSOVO CLUSTER AND BUSINESS SUPPORT PROJECT



May 23, 2006

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IMPROVING PASTURE AND FORAGE PRODUCTION

BENEFITS TO FARMERS RESULTING FROM PROPER PREPARATION OF FORAGE AND SILAGE FEED TO MAXIMIZE THE NUTRITIVE VALUE OF FORAGE PRODUCTION.

Kosovo Cluster and Business Support project – Improving Pastures and Forage Production
Contract No. AFP-I-00-03-00030-00, TO #800

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The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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PURPOSE OF ASSIGNMENT

The purpose of this assignment is to improve pasture and forage production for milk producers of the Kosovo Association of Milk Producers (KAMP) and other farmer associations by visiting farms in different areas, preparing recommendations for improving forages for dairy producers, and giving field workshops and presentations to farmers and other stakeholders.

BACKGROUND

Proper preparation of forage and silage feed represents the most important factor influencing the nutritive value of forage production. The cost of feed represents over 60% of the total cost of milk production.

Currently in Kosovo, there are more than 130 farms with 10-150 cows per farm. The average yield per cow is still very low. One of the reasons for this is the bad quality of forage, untimely harvesting and the failure to feed the animals high protein & energy feed. The key to producing high quality forage is the timing of the harvest. As forages (grasses or legumes) mature, the amount of fiber increases and the amount of protein and energy decreases, resulting in poor performance from the cows. High quality forages are a must if the farmer is going to have a high producing herd of cows. Just going to the field and harvesting the forage earlier can achieve a substantial increase in the amount of milk produced per cow.

EXECUTIVE SUMMARY

This assignment was a follow up to two KCBS assignments made in 2005. It was gratifying to see many of the larger farmers, which were the ones I worked with last year, had adopted the recommendations I had given. This was especially so when they volunteered information to other farmers in training sessions as to how much their milk yields had improved as a result of cutting silage at the correct point of its growth, and in subsequently storing the silage correctly.

During this visit there was more interaction with other stakeholders, particularly the University Faculty of Agriculture and the Milk Producers Association, KAMP. The KAMP initiative in round baling was well received by the farmers on the two occasions I was able to attend; this should improve the quality of silage that farmers use and KCBS should continue to support the initiative. KCBS should also ensure feedback is collected, analyzed, lessons learned and improvements recommended. In parallel with these improvements, KCBS should work with Faculty to set up process for analyzing forage samples from farmers and associations.

In visits to pastures [one of the most underutilized resources in Kosovo], where KCBS is conducting field trials, we discussed fertilizers applied to the different pastures this spring and the growth difference. I recommend that KCBS should arrange for small areas to be fertilized 30 days prior to my next visit scheduled for August. Field days should be arranged to show extra late summer growth, where we can discuss yields and greater intake. I have also recommended that a grazing study be carried out on these pastures.

FIELD ACTIVITIES TO ACHIEVE PURPOSES

Fieldwork consisted mainly in visiting specific farms and studying their practices. The visits concluded with recommendations for improving practices in such matters as forage collection, seed preparation, fertilizing practices, harvesting equipment settings and adjustments, and storage of silage. In respect of the latter, I provided much advice on silage bunker layouts and management. At several farms, I performed periodic sampling of alfalfa yield and quality.

My assignment coincided with the first making of round bales and wrapping under the grant to KAMP from KCBS. I was able to advise on the correct moisture content/dryness that the silage should exhibit before being baled; by intervening thus on the first demonstration, KAMP avoided what might have proven to be negative publicity for the venture.

I gave seminars, often at the farms to which several farmers from neighboring farms came; and I also attended workshops put on by other stakeholders.

RECORD OF DAILY ACTIVITIES

Following is a list of my daily activities during the course of this assignment with details of the activities.

Monday - May 1

I worked at KCBS office to prepare my seminars.

Tuesday - May 2

Traveled to Gjakove and gave seminar 32 farmers. One farmer who attended said he had harvested alfalfa early last year, as recommended, and got 5 cuttings (3 to 4 is normal) and milk production went up 2 liters per day. We visited three farms. The first made excellent corn silage last year and was going to cut alfalfa on May 2 or 3 (at the appropriate time). He was going to chop the alfalfa and make alfalfa silage. The second farmer was just starting dairying and had some grazed pasture. We talked about rotational grazing. He had a low yielding field, which I recommended cutting immediately and then as appropriate for the remainder of this season. I then recommended plowing the field this fall and reseeded next spring. We visited a third farm where the farmer had made a pile of alfalfa/clover/grass silage without chopping. It had molded and was unsuitable for feeding. UNMIK TV was present and stayed for the seminar and farm visits. They had a short report on RTV on Saturday (May 6) and the following Tuesday.

Wednesday - May 3

Visited Prizren to participate in a seminar hosted by KAMP. There were about 22 farmers present. We discussed forage quality and when to harvest. The hay fields were ready to be harvested. My seminar was followed by a German who also talked about forage quality. The KAMP group then met to organize for the collective round baleage making that is a sponsored project of the organization with the assistance of USAID.

Thursday - May 4

Went to Lipjan agricultural technical school. We met with professor from the university to discuss the protocol of the subcontract for periodic sampling of alfalfa yield and quality. We encouraged that the first cutting be at the mid bud stage rather than at the 10% bloom stage as planned (within 1 week).

We visited two farms. One farm had medium quality corn silage and hay. The cattle were thin and mangers were empty. We suggested feeding more hay, especially since he had a good supply of it. He had the opportunity to feed orts from dairy cattle to bulls that he was growing for meat. At the second farm, we viewed two fields. One 9-year old stand of alfalfa

was grassy, and should be harvested immediately. It was also deficient in phosphorus. The second field was 3 years old and had a good stand of alfalfa that had been fertilized with 15-15-15. It did not need the nitrogen but benefited from the phosphorus and potassium.

In the afternoon we gave a seminar to about a dozen students and 3 instructors. Local TV was present and took video for a short program.

Friday - May 5

Visited Xheudet Morina Dairy Farm in Rogova. He has attended USAID-KCBS seminars and was very accepting of information. He had made his corn silage earlier last year and thought it was much better. We examined the manure and saw very little grain in it, unlike last year. He was ready to cut the alfalfa. He had ventilated the barn and was managing calves very well. He felt that the USAID KCBS recommendations were responsible for increasing his milk production from 18 to 33 liters per cow per day.

We also visited Vitomiric Dairy and spoke with Baj Ramkrasniqi near Peje. He is managing a large state farm that was privatized. There are no cattle but the owner will be purchasing 100 head in the near future. At this point they were planting corn and getting ready to harvest forage for the cattle when they arrive. He has some alfalfa and intends to make hay. One field I examined has alfalfa around the end and down one side. He had apparently not mixed the seed in the drill well or tried to mix seed of very great size/density so that the alfalfa was seeded first and then the rest of the field with the remainder of the seed. I told him alfalfa is ready to be cut now. I examined his New Holland mower/conditioner. I recommended that he widen the deflectors to make a wider swath and that he adjust the conditioning rollers after he starts mowing. He mentioned growing corn silage to put in the bunkers. I recommended that he calculate how much silage he will use per day and only fill a partial width of the bunker or a shallow depth since the bunkers were stated to be designed for 1,000 cows and he could not keep ahead of spoilage if the bunkers was filled to the full width and depth.

Saturday - May 6

We went with Dr Fadil Millaku and Dr. Sylë Sylanaj (professors from the University and project coordinator and executive director, respectively, for pasture trials) to view pasture-seeding trial in the Podujeve region. They were competent and knowledgeable individuals concerning pasture species. The farmer, Hakif Zuka, had tilled an area and seeded a portion to red clover and a portion to red clover and a mixture of grasses. Fertilizer had been applied to the area and to an untilled area. The red clover and grass seedlings were coming up. The fertilized, untilled area was about 20 cm tall. It had good grass content but also many weeds. We discussed that the weeds were palatable and good forage at immature stages (now). Professor Millaku intended to come back over the next month and determine botanical composition of the fertilized area. We talked to him about having the farmer graze most of the fertilized, untilled area because if weeds were left to mature, this would leave a bad impression with the farmer and defeat the purpose of the fertilization trial. We also discussed that, if the farmer put 3 to 5 cows on the fertilized area for 3 to 5 days, we should record milk production for 3 days before and during the 3 to 4 days of grazing. This should show increased milk production from having more available forage and allowing the cows to take bigger bites.

We visited farmers in the Penuh and Podujeve regions with the municipal agricultural executive director. Mustaff Deda, a farmer visited last year in the Penuh region, had an alfalfa field that was ready to be cut. A second field would be ready in the next week. He was going to attempt to get it baled and wrapped with plastic. We visited his bunker silo and it was full of bad silage. It was near the river, which had flooded into the bunker silo last week. We suggested a berm to keep flood water out. He had also put some unchopped alfalfa into the silo in a layer last year, which had not fermented well (it had butyric acid).

This would greatly reduce animal intake. The bunker was too big for the number of cattle and was molding across the front. Spoilage losses were in excess of 30%.

We visited another farm, Samk Haziri in the Podujevo region, where the forage quality was high. These were the first over-conditioned cattle I have seen in Kosovo. He had followed our advice and had excellent quality forage. His major question was how to get cattle bred. He said that he had not been able to get any cows bred by artificial insemination in the past three years.

Monday - May 8

We visited Milazim Johuzi and Mehmet Beqiri, farmers in the Vushtrri region. We looked at one field that was alfalfa, red clover and grass (less than 20%). I recommended harvesting in the next two days. The hay stack was under plastic and well preserved. He had made corn silage that was cut to proper length and well fermented. The pile was properly sized for the herd number he had.

The second farmer had a new facility (still under construction). He had to buy feed up to this point. I explained how the corn silage was chopped with a good length and packed well but that it had been harvested too late. I showed him the corn grain in the cattle manure and explained that that was wasted energy that could be producing milk. I discussed the possibility of dividing the herd (mainly Holsteins) into two groups and feeding more haylage to the top group because it would result in more milk if forage was harvested soon. Purchased hay was in flower when harvested and not good for high milk production so this and the corn silage should be fed to the bottom group. Cows were also thin, the farmer said they were working on that and the cows had gained condition recently. He asked how much of the haylage he should feed.

We met with Q. Kukalay, Permanent Secretary of Kosovo Agricultural Ministry. We discussed what we had been doing and the good results that farmers had been achieving from earlier cut forage. We discussed what could be done to improve the great resource of pastures in Kosovo.

Tuesday - May 9

Visited the pasture trial of Martin Shala, Nashev-Prizren.. This is on a sheep pasture. The trial was seeded two weeks late due to early wet weather. Tillage prior to seeding was minimal and was likely not sufficient for good establishment, except in a few spots. The applied fertilizer was showing small response at this point. I believe that too little fertilizer was applied and recommended immediate application of another 200 kg of fertilizer to the plot area. There was an adjacent area where sheep are overwintered and were fed so that manure is accumulated. The standard practice is the not graze this area and to take two hay cuttings off of it. The height difference was about 30 cm between this area with overwinter manure and the unfertilized portion of the pasture.

We visited the Rudina dairy. He asked about feeding protein. He is feeding corn silage that was harvested too late as evidenced by hard grain kernels in the silage and manure and the hay was largely stems. He was feeding concentrate that was 17% CP so the likelihood of additional protein response is high. I suggest that one of Roy's formulations be sent to him. The hay was largely stems because it was alfalfa that was mowed but not conditioned. Farmers using alfalfa should be encouraged to condition the hay to make the stems dry at the more similar rates to leaves.

We were present for the KAMP first making of round bales and wrapping. The largely grass forage, with some clover, had been cut two days before and rained on. The field had one high yield portion that was really too wet. (He should have turned the hay about two hours

prior to baling) and the remainder of the field was dryer than desired for baleage. They made 20 bales from 3.5 ha according to KAMP.

Wednesday - May 10

We visited Idriz Vehapi (Zatriq, Rahovic Municipality) who has a site of the pasture seeding trial. The Trifolium pretense was just germinating and appeared to be coming up well. The grasses were also beginning to emerge. Fadil was along and said he would go back to do stand assessments in about two weeks. These pastures are usually harvested for hay in early June and then later grazed. He applied less than 1 kg/ha nitrogen and potassium with the fertilizer application. I suggested that he immediately apply some more fertilizer because the amount applied is insufficient for the grasses to get started and for the red clover to grow (60 kg/ha potassium is closer to actual usage). If fertilizer limits establishment, we will not learn what was successful from the establishment standpoint. Fadil was reluctant to do this. I encouraged him to provide additional fertilizer to at least a 4x4 meter area.

We then visited Naim Bilalli (Acarevë, Skenderaji Municipality) who is also a site for the pasture seeding study. We met with about 8 farmers who were also present. We discussed the importance of pasture forage height and density for good animal performance. This region has many former fields that were simply abandoned. These sites were overgrown with weeds and are now being grazed. The site of this study has a variety of species that are of no or little value to cattle, there is very little grass. This means that the fertilized only areas will not likely produce worthwhile pasture. The new seedlings appeared to be establishing and should produce useful information. Again I encouraged applying fertilizer to at least a small area (4x4 m) over each seeding.

Thursday - May 11

Visited pasture trial on farm of Bekim Koxha, (Daganaj-Kacanik Municipality) which is a sheep farm. The plots had been seeded and fertilized April 19. Red clover seedlings were just starting to emerge. A very few recently-emerged grass seedlings were visible. The area had been disked very lightly and little tillage of the existing sod occurred. The grass (largely bluegrass) was coming from the sod and would likely shade out most of the grass seedlings. The red clover has some chance of surviving and contributing to the stand. The intent is to harvest the pasture for hay in mid June and then graze in late fall. No recommendations for any changes to intended management of the study are made.

Gave seminar on silage making to second year Agricultural students from Kosovo University. About twenty were present.

Friday - May 12

Prepared powerpoint and gave report to USAID

In afternoon went to Lipjan area to speak to farmers about making baled silage. The group (about 14 farmers each with over 30 cows) was organized by KAMP. Kurtesh Sherifi, executive director, and four others involved in their baled silage making operation were also present. We discussed the need to cut early and the value of silage (how the field behind us could be baled for silage now but was likely not to be ready for hay for another 4 to 5 days and it was expected to rain that evening). We also discussed some practical aspects of making baled silage (number of film layers needed, moving to barn before wrapping). One farmer had wrapped with two layers and had had spoilage last year; the farmer of the host farm showed us where a bale had been wrapped with about 20 layers in some places and 2 layers in other places. The thin places had holes and had had spoilage according to the farmer. There was discussion of need for good tape to repair holes in the plastic. We also discussed how to switch from feeding hay to feeding silage.

TASK FINDINGS AND RECOMMENDATIONS

These have been incorporated in the foregoing Record of Daily Activities.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE ACTIVITY

1. KCBS should continue to encourage early harvest of forage through publications and results of maturity sampling contract.
2. KCBS should encourage University Faculty to set up process for analyzing forage samples from farmers and associations.
3. KCBS should continue to support baleage effort with KAMP:
 - a. Follow up with farmers who made baleage and have field days to discuss what is done right and what went wrong.
 - b. Locate source of duct tape or comparable for farmers to repair holes in wrapped bales.
4. Pastures are the most underutilized resource of Kosovo.
 - a. Follow up with recommendations to pasture subcontract (below).
 - b. Work to encourage good production from pastures.
 - Fertilization results to be highlighted and information spread.
 - Stress need for good supply of available forage (big bite/little bite).
5. I could return in late summer and help with following:
 - a. Organize rate of quality change data from subcontract with University for presenting to farmers and have seminars with University faculty. I would help position the data to best explain to farmers.
 - b. Help with field days reviewing baleage success/failure.
 - c. Explain forage analysis to farmers to highlight differences in forage and encourage them to test.
 - d. Pasture efforts:
 - Talk about fertilizer applied to pastures this spring and growth difference
 - Talk about milk gain from additional available forage
 - Milazim could fertilize small areas (4x4m) 30 days prior to my arrival and have field days along with Professor Fadil to show extra late summer growth, take about both tonnage and greater intake.

Recommendations for Grazing Study

- A. Dr Fadil Millaku appears to be a sound individual who will complete a project. He will be a good working partner on field days and future efforts.
- B. Pasture in Podujeve region is doing well. The fertilized, unseeded area is growing tall with both grass and weeds. If left to mature it will be a weedy unpalatable area and give a bad impression for fertilization. The weeds are now good quality and would be grazed. We recommend having the farmers put 3 to 5 head on area and grazed until area is down to 10 cm. If milk production of these cows were recorded for 3 days before and during 3 days of grazing this area, it might also be possible to get a good number of effect of forage quantity on milk production
- C. The trials at Zatriq, Acarevë, and Daganaj regions are larger sites. It appears that 100 kg of 15-15-15 fertilizer was applied regardless of the pasture size. I recommend that at least small areas of these sites be immediately fertilized because no fertilizer response was visible even though manure showed a response at some sites. The areas could be as small as 4x4 m and should be fertilized to receive about 30 kg/ha of each nutrient.
- D. All sites should be grazed or have hay made during the first two weeks of June to reduce competition of the existing sod to the new seedings.
- E. Some of the site (especially Daganaj, and Zatriq) had minimal tillage and grass seedings may not be successful, hopefully clover seedings will.

ANNEXES

Annex I: Making and Feeding Wrapped Bale Silage – Trifold Flyer

Annex II: The Silage Making Process – Trifold Flyer

Annex III: PowerPoint Presentation to USAID

Harvest forage when high quality

The most important step to good silage is to harvest forage when it has high quality.

Silage will only preserve what was harvested. It will not make poor quality forage better.



Harvest alfalfa at bud stage

It will gain 0.5% fiber per day



Harvest before head emerge

It will gain 1% fiber per day

Bale at 50 to 65% moisture

Forage is 75 to 80% water when cut.

Preferred moisture for baling is 50 to 65%

If baled too wet, will get butyric acid and, possibly, clostridia. Cattle will not want to eat silage and may get sick.

If baled dryer than 50%, bales still preserved but less fermentation occurs – bales will mold faster when feeding. Also, do not stack bales as they will get hotter than if baled wetter and may start fire.

Dry to 65% moisture or less –

- If average, sunny weather conditions, cut one day and bale the next.
- Actual drying may be slightly faster or slower depending on weather.

A bundle of 15 to 20 stems should be tough. Twist and if break too easily, forage is either too wet or too dry.

Move to storage location before wrapping

Moving bales after wrapping will likely cause breaks in the film and result in spoilage.

So move bales first to storage location and then wrap.

Choose storage site carefully:

- ✓ Move bales off field so next crop can be harvested
- ✓ Store near barn for ease of feeding
- ✓ Make sure site has good drainage so bales do not stand in water after rain
- ✓ Is site accessible in snow?
- ✓ Is site away from where birds will land on bales and punch holes in film?
- ✓ Is site away from cattle, children, etc?
- ✓ Keep weeds near storage site short to reduce rodent damage



Wrap Properly



- **Wrap within 24 hours after baling**, waiting longer will cause excessive heating and protein and energy loss
- **Cover with at least 8 layers of film**, fewer layers will result in oxygen leakage and moldy hay (below). More holes will also occur.
- **Check weekly and patch holes** immediately. Use a fiber based (e.g. duct) tape. Plastic based tape will become brittle due to UV light and fall off.

Feed Properly

Fermentation in bales will be largely complete in 14 days for grass silage and 21 days for alfalfa.

Feeding before the end of fermentation does not hurt cattle. Though, intake may be reduced if the bales are very hot.

Silage will begin to mold again as soon as bales are opened to feed cattle.

How fast the mold occurs depends on degree of fermentation (better fermentation will mold more slowly) and air temperature (mold grows slower in cold temperature of winter).

It is best is to feed the entire bale within 3 days of opening it (one day is best).

Thus, if feeding 30 kg of silage per day (12 kg dry matter), it will take 17 cows to eat a 500 kg bale in one day. If you have less than 6 cows (number required to eat bale in 3 days) consider feeding to heifers and other animals or making smaller bales.



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Making and Feeding

Wrapped Bale Silage



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MAKING GOOD SILAGE

Harvest at correct crop stage

- *Forage quality declines*
 - Forage quality declines with advancing maturity in grasses and legumes
 - Harvest grasses when head is in leaf whorl
 - Harvest legumes at bud stage
 - Harvest corn at half milk line

FUNDAMENTAL STRATEGY IN PRESERVATION OF SILAGE

Exclude oxygen from silage mass, and reduce the pH rapidly through bacterial fermentation.

CHALLENGES FOR MAKING GOOD SILAGE

- Minimize respiration losses
- Lactic acid fermentation requirements
- Provide sufficient Lactic Acid Bacteria
- Minimize protein solubility (alfalfa)

Minimize respiration losses

- **Lactic acid fermentation requires:**
 - Sufficient plant sugars
 - Lactic acid bacteria on forage
 - Anaerobic conditions
 - Proper dry matter content

SHORTENING AEROBIC PHASE

- Harvest at correct moisture (60 to 65%)
- Chop short
 - Chop short (75% less than 1 cm, 20% longer than 3 cm), kernels broken
- Fill/wrap rapidly
 - Recommend 2 days or less
 - Wrap within 24 hours
- Pack well

SHORTENING LAG PHASE

- Harvest at correct moisture (60 to 65%)
- Fill/wrap rapidly
 - Recommend 2 days or less
 - Wrap within 24 hours
- Pack well
- Wrap with 6 layers of plastic/cover quickly



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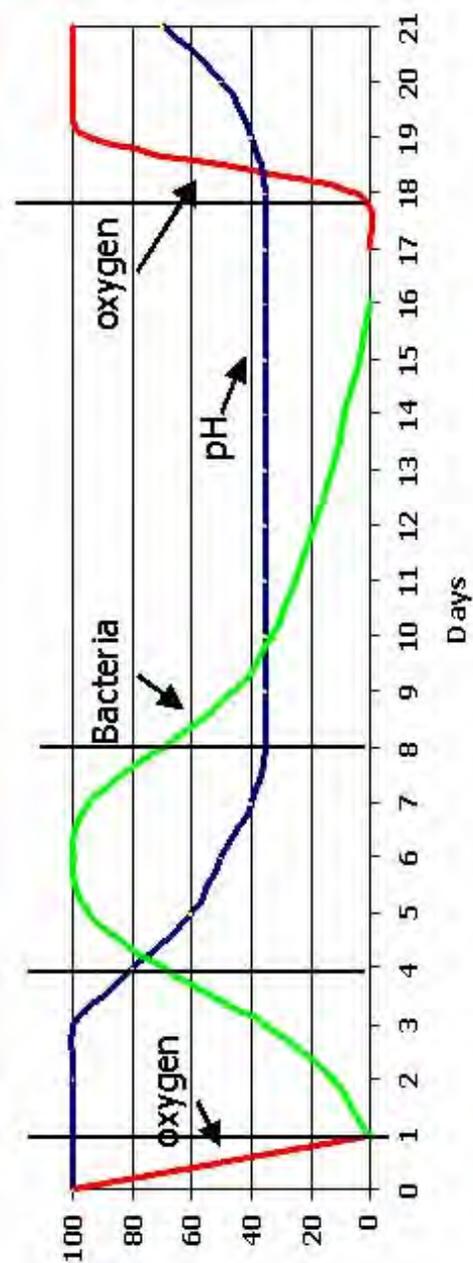
Dr. Dan Undersander
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THE SILAGE MAKING PROCESS





Phases of fermentation process



Dry matter loss as influenced by silage density

Silage Density (kg of DM/m ³)	DM loss at 180 days (% of the DM ensiled)
160	20.2
225	16.8
255	15.1
290	13.4
350	10.0

CHALLENGES FOR MAKING GOOD SILAGE

- Minimize respiration losses
- Lactic acid fermentation requirements
- Provide sufficient Lactic Acid Bacteria
- Minimize protein solubility (alfalfa)

MAKING GOOD SILAGE

- Harvest at correct crop stage
- Correct moisture for ensiling
- Minimize field losses
- Minimize oxygen in silo
- Manage feed out to minimize losses



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Report to USAID for KCBS

Dr. Dan Undersander



Scope of work

- Perform a short-term (two week) assignment in May of 2006
- Visit selected crop producers, pastures, and feed forage producers;
 - Determine the conditions of forage production, and determine quality of feed.
 - Identify resources needed based on six selected farm visits
 - Identify efforts by KCBS staff in following-up with these farmers and others.
- Checking procedures producers used in collecting of forage samples for testing
 - Sample fields of alfalfa and grasses at different stages of maturity and analyze for forage quality
- Produce Seminars
 - Two seminars on good harvesting time for forages
 - One seminar on hay and silage preparation,
- Recommendations and plans on future implementation to be used by KCBS staff and local service providers in future trainings.
- Specific recommendations to improve the quality of forage and silage preparation.



Visit selected crop producers, pastures, and feed forage producers

Gjakove – visited 3 farms

Prizren – visited Rudina dairy

Lipjan – visited 2 farms

Peje – visited 2 farms

Podujeve – visited 2 farms

Vushtrri – visited 2 farms



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Seminars

- Gjakove to 36 farmers
- Pizren (hosted by KAMP) to 32 farmers
- Lipjan to students/farmers 15 students/farmers
- Kosovo University students 20 students





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Seminars followed by field tour





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Reviewed Pasture Establishment Sites

- Visited pasture management subcontract plots with Dr Fadil Millaku and Dr. Sylë Sylanaj in Podujeve, Rahovec, Skenderaj
- Visited sites at Kacanik and Prizren
- Made specific recommendations for each site



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Other activities

- TV footage for UNMIK
- TV footage and interview for RTK
- For subcontract on with Kosovo University faculty helped define maturity stages for alfalfa best stage of maturity sampling
- Initiated forage sampling of wrapped bales and talked to University Faculty about results.



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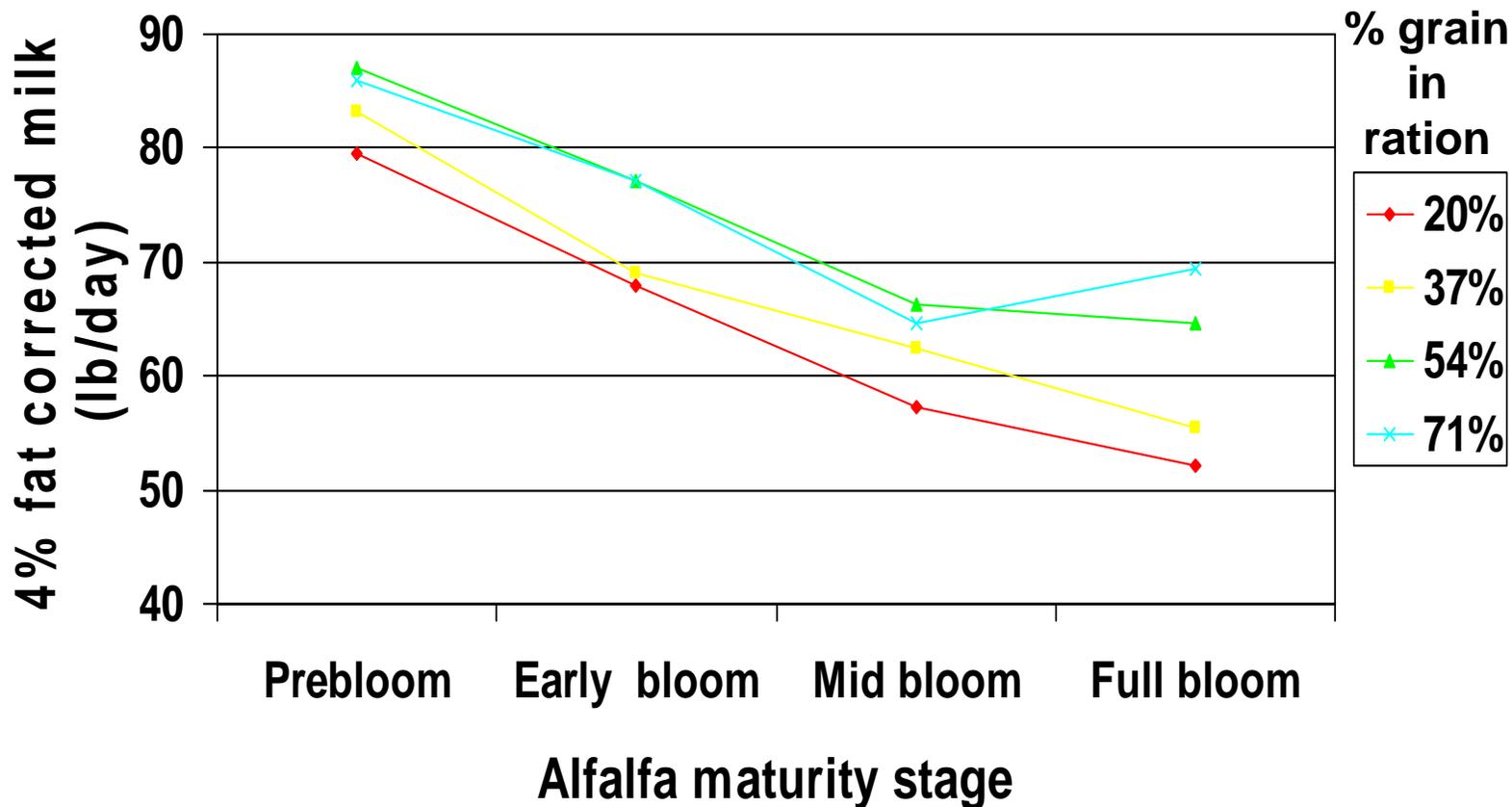
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Major messages

- Harvest hay and silage earlier to get more milk and meat



Effect of forage quality on production at four concentrate levels





Harvest grasses at proper stage for milk production



Boot
stage

1330
liters milk
per ton
of forage



Heading

625
liters
milk per
ton of
forage

Harvest grasses before heads appear



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Harvest alfalfa at proper stage for milk production



Bud
stage

1450
liters of
milk per
ton



Late
Flower

900 liters
of milk
per ton

Harvest alfalfa before flowers are visible



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Major messages

- Harvest hay and silage earlier to get more milk and meat
- Make baleage to preserve forage quality



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Major messages

- Harvest hay and silage earlier to get more milk and meat
- Make baleage to preserve forage quality
- Fertilize and manage pastures for better animal production



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