

PASTURE IMPROVEMENT AND TRAINING REPORT
ALBANIA PRIVATE FORESTRY DEVELOPMENT PROGRAM
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ACRONYMS

APFDP	Albania Private Forestry Development Program
AUT	Agricultural University of Tirana
FPRI	Forest Pasture Research Institute
HPI	Heifer Project International
MOAF	Ministry of Agriculture and Food
N	Nitrogen
NGO	Non-governmental organization

SECTION I

Overview and Objectives

The purpose of this assignment was to help private pasture owners increase the carrying capacity of pastures in an economically viable and ecologically sustainable way by providing the following assistance:

1. Recommendations for pasture improvement interventions
2. A training package for future training of private pasture owners
3. A strategy for future Albania Private Forestry Development Program (APFDP) involvement in pasture improvement

Overview of activities. Activities included field trips to the Lezhe, Shengjergj, and Pogradec areas as well as Duress and local areas near Tirana, review of reports and documents, interviews and meetings with representatives of Agricultural University of Tirana (AUT), Ministry of Agriculture and Food (MOAF), and sessions with APFDP and Heifer Project International (HPI) staff to identify needs and develop training protocols.

The first field trip, which occurred during the first full day in country, was to the Lezhe district. Besides providing valuable contact with group participants and an understanding of local production programs and vegetation, the trip gave APFDP staff an opportunity to inspect the health of rams that had recently been placed in Lezhe following quarantine in Shengjergj, where rams had been reported to be ill. The trip also provided a chance for the entire group to meet.

On arrival, the group was met by the local veterinarian, Gjon Lazri, who accompanied group members on the field trip. The rams that the groups saw all appeared healthy and thriving, with an obvious size advantage. Group members concluded that the animals' short-term illness had been caused by transportation stress and altitude change. Following the rams' recovery, group members were anxious to increase herd numbers and productivity using the new breed. The group also examined private pastures at several nearby locations.

The group spent two days on a field visit to Shengjergj and Biza. At Biza, local veterinarian Reshit Xara met us on grasslands that were being cut for hay, providing an excellent opportunity to examine plant growth and species diversity. A large family of about 10 adults met with us as they harvested hay on their land. The family discussed converting their large, high-maintenance Holstein cows to a better-adapted breed. Family members expressed their desire for mechanized cutting tools to reduce the labor needed to harvest hay for winter feed. The group viewed several mountain summer pastures from a distance, but did not actually visit these pastures, many of which are used for hay.

Although the two-day field visit to Pogradec was interrupted midway by illness, this visit included the field trips' most productive interview with shepherds on grazing practices and constraints. The head of the local livestock group, Vladimir Celo, and local veterinarian Gezim Fraholli joined us in examining foot rot-related problems in an HPI ram and other sheep in the village.

Other activities included brief day trips to Duress to view saline pasture near Spital, accompanied by local livestock specialist Elfrida Roco, and around Tirana, accompanied by Sami Cenko, pasture specialist in the Forestry Directory of MOAF. These trips provided further information on local pasture

problems and opportunities to discuss potential improved practices.

In addition to field trips, the group held meetings with a variety of local pasture-development and livestock specialists. These specialists included: from AUT: Forestry Faculty dean Mihallaq Kotro, pasture specialist Orjon Ngjela, and livestock specialist Myqerem Tafaj; from MOAF: Luan Hajno, small ruminant specialist at the Livestock Research Institute, Land Research Institute soil specialists Vangjo Kovaci, Perparim Laze, and Sokrat Dhima, and livestock specialist Kristaq Gjini and pasture specialist Sami Cenko of the MOAF Forestry Directory; and from HPI: Daut Nanaj director of HPI-Albania. These meetings provided further insight on constraints facing the users of Albanian pastures and forests.

The group reviewed numerous documents, including several APFDP quarterly and annual reports and work plans, documents from various silvo-pastoral management projects, and training manuals and materials.

Appreciation is expressed to the entire APFDP staff for their assistance during this first-time visit to Albania. Despite challenges that included the conclusion of Erling Nielsen's tenure on the project, Jim Seyler's vacation, Daut Nanaj's illness, and difficulties organizing meetings with various staff members from MOAF, AUT, Forest Pasture Research Institute (FPRI), and other agencies, the project staff was successful in arranging a number of useful meetings and interviews. Fejzo Begaj provided valuable services translating and coordinating during trips and meetings.

SECTION II

Pasture Improvement Recommendations

This report provides recommendations on three levels — direct pasture improvement interventions, training for farmers and APFDP staff, and development of longer-term strategic planning. Since Albanian farmers use the term *pasture* to refer to all forage-producing lands — cultivated or natural, cut for hay or grazed, summer or winter — this report uses the term in a similarly broad sense. When possible, specific terms like natural hay land or summer-mountain grazing land are used to minimize confusion.

Possibly the greatest obstacle to improving Albania’s pastures is the low priority farmers place on pasture concerns relative to livestock husbandry. This is natural, as farmers receive only indirect benefits from pastures: pastures cannot be sold or consumed. Unlike an animal, a pasture do not easily communicate that it is ailing. The rebirth of a pasture following drought or winter is not as distinct an event the birth of a lamb, calve, or kid; nor is its loss as heart-wrenching as an animal’s death. To build understanding of the importance of healthy pastures, it is critical to link pasture husbandry with animal husbandry whenever possible. Certain linkages are included in the recommendations that follow.

A. Pasture Improvement Interventions

Recommendations to improve pastures are based on several assumptions. One such assumption is that few farmers have the money to invest heavily in pasture improvement; at the same time, many resources that increase pasture production, such as fertilizer, pesticides, and seeds, are expensive relative to the benefits received. Monetary investment in pasture improvement has a potential benefit only for private pastures. In addition, Albania may have an export advantage over many other countries in organic production of animal products, reducing the incentive to turn to interventions requiring monetary investments. A notable exception, legume use, receives high priority because it can fix nitrogen in the soil while improving feed value to livestock. In Albania, research experience and data are limited on the expected response from changes in practices. Therefore, plant species observed during field trips were used to guide recommendations. Before major interventions are designed, localized testing should be carried out.

Self-determination — based on farmers’ observations of test plots, demonstrations, other farmers’ practices, and their families’ needs and experiences — will provide the basis for long-term adaptation of new practices. After working with farmers to identify their wants and needs, training on plant and animal systems should be combined with recommendations and localized testing.

•Recommendation 1: Develop holistic grazing strategies with farmers that include rotational grazing or intensively managed grazing as a regular grazing routine.

Lasting grazing land improvement only occurs when all users understand plants’ recovery needs and practice good grazing land husbandry to maintain plant health. Problems like weed invasion, low dry-season carrying capacity, and weakened soil health are often due to “impatient grazing” — that is, users that graze their animals before pastures are green and have started to grow before grazing their animals. While impatient grazing may appear to provide animals a high-quality diet in the short run, they still may not consume the desired quantity of nutrients: short

plant growth reduces bite size and the nutrient intake. In addition, impatient grazing prevents most productive plant species from reaching their growth potential.

To make wise grazing decisions, farmers need training in basic plant-growth principles, emphasizing sunlight capture by leaves and underground root growth to collect water and minerals (see the section below on training recommendations). While simple rotational grazing strategies can and should be established prior to completing this training, farmers must understand basic plant-growth principles to adjust to changes in weather, livestock numbers or needs, and pasture interventions.

•Recommendation 2: Harvest and store hay that meets the nutritional needs of livestock from cultivated hay land (mostly alfalfa) and natural hay land (primarily grasses with varying amounts of legumes and forbs).

Much hay is harvested when plants are too mature, making it difficult to achieve optimum livestock production. More hay should be harvested at less mature stages to provide higher nutrient concentrations. This high-quality hay should be saved for feeding during those times in the production season — such as peak lactation and insemination — when animals need high nutrient levels.

Periodically, samples should be collected that accurately represent hay production. The samples should be tested in a laboratory to measure the concentrations of important nutrients including crude protein, energy, fiber, and selected minerals and adjust rations. To obtain such analyses, APFDP may need to cooperate with AUT or MOAF's Animal Research Institute.

Farmers must store hay to ensure access to hay of various quality at all times. Maintaining a greater number of smaller stacks of hay of differing feed values for different uses is a simple way to accomplish this.

•Recommendation 3: Encourage grazing on pastures cut for hay immediately after hay is removed, then avoid grazing for 4 to 6 weeks.

Immediate grazing gleans harvestable material left after hay is cut. Allowing plants to regrow before the next grazing produces healthier, more vigorous, higher-producing plants that compete better with weeds like thistles. Frequent, short grazing weakens the plants that animals eat and permits undesirable plants an opportunity to expand.

•Recommendation 4: Seed additional legumes into natural hay land and private cultivated pastures, and begin on-farm research for better-producing legumes.

Natural legume populations like medics, trefoil, and clovers, along with cultivated alfalfa, are species that well adapted to the region. Since they fix their own nitrogen and can improve animal performance, they should be emphasized in pasture-improvement interventions.

Existing populations of these plants in grazed areas appear to be low-yielding, possibly the result of natural selection to survive overgrazing. With improved grazing practices, higher-yielding types will survive and increase production in hay land. A critical element in this process will be selecting the right new species and varieties, which may be achieved through recommendation 5 below.

•Recommendation 5: Develop local botanical gardens to test adaptability of grass and legume species and varieties.

Adaptable plants can often be identified among those grown in similar regions around the

Mediterranean and Balkans, especially in southern Italy. If information on a specific species or variety cannot be found, risk can be minimized through small-scale local plantings to observe a plant's potential. Such plantings should include other plants that are adaptable to the area to provide a visual comparison and help local farmers decide if planting the new species or variety is desirable for them.

•Recommendation 6: Identify alfalfa-growth restrictions near Biza and similar regions, developing strategies to grow more alfalfa in these areas.

Past attempts to grow alfalfa near Biza have been unsuccessful. Since other legumes appear thrifty, these problems were probably due to the variety planted, poor rhizobium inoculation of the seed, or soil fertility and pH. These problems can often be solved easily and economically.

APFDP should support investigations to solve this problem, as similar areas in other parts of the world grow alfalfa well. Such investigations would include the following steps:

- Collect and analyze soil samples
- Plant small areas with alfalfa, applying lime or other fertilizers if indicated (land previously seeded with potatoes would probably be best suited for re-seeding to alfalfa)
- Compare seed with and without rhizobium inoculation, checking for effective nodule formation after plants develop
- Work with alfalfa seed suppliers to obtain small quantities of seed of varieties better adapted to high elevations and lengthy winter snow cover than commonly used low-land seeds

By following the steps outlined above, the risk and cost to APFDP and participating farmers should be low. Following a potato crop, land usually does not produce a hay crop for one and sometimes two years, due to the pasture's natural regeneration. Therefore, there is little risk of lost production. Regardless of variety selected, farmers will need to purchase alfalfa seed. Farmers should purchase seed that has been pre-inoculated by seed companies when available, even when soil has sufficient natural populations. Rhizobium inoculum is inexpensive, and the new bacterial strains fix nitrogen more efficiently. The only foreseeable limitation to alfalfa development in the region is a large expenditure on lime or fertilizer.

Recommendation 7: Encourage re-seeding pastures near Biza following potato crops — especially with legumes and possibly high-yielding grasses — instead of allowing natural re-vegetation.

After potatoes are grown in a field, no crop can be produced there for one or two years. Re-seeding will hasten the return to production, improving both production quantity and quality, and may reduce undesired plant species like thistles.

Increasing the legume percentage in hay will improve animal productivity, and may increase hay yield from extra nitrogen fixation. Trefoil (*Lotus*) is present, but appears to be low-yielding, possibly due to natural selection to survive heavy grazing following the hay harvest. More productive, hay-type varieties are needed. Several clovers are also present — red, alsike, and white.

While naturally recurring grasses are generally desirable, yields could increase if adapted varieties of orchard grass (*Dactylis*), timothy (*Phleum*), and perennial ryegrass (*Lolium*) made up a larger percentage of the grasses.

Seed cost and availability could pose major barriers.

Recommendation 8: Study the feasibility of Albanian-grown seed.

Albania's dry summer weather, combined with moderate irrigation availability, is well-suited for developing a grass or legume seed industry for in-country use or export.

In-country, seeds of adapted varieties of desirable plant species could be provided to farmers for planting and multiplication, who may be required to "pass on the gift" following HPI guidelines. Farmers can use extra seed to sell or plant in their own pastures.

Recommendation 9: Stimulate production of lamb or veal on summer pastures in Shenghergj and similar regions.

Lambs, which weigh about 15 kg, are usually sold in April or May. If grazed through the summer and sold in September or October, lambs will weigh about 40 kg and sell for about twice as much per animal.

Summer pasture is plentiful in the region's mountains. Much is harvested for hay and transported great distances, but a great deal more is underused. Grazing, an inexpensive harvesting method, is the only way some forest areas can be used. While water availability is unknown, the many catchment ponds and natural springs appear to enhance the site's suitability. Stables should be constructed to protect animals at night. Financial estimates by Daut Nanaj, Luan Hajno, and Anila Vendresha suggest that the required investment of 245,000 leke could be paid off in one year.

To assist in implementing this recommendation, APFDP can help provide credit or collateral to establish one or two demonstrations with farmers and shepherds. If a farmer does not have enough lambs in his flock nor the resources to purchase lambs, APFDP could purchase lambs and hire the shepherd for the summer to raise the lambs. In the fall, shepherd would be allowed to purchase the lambs from APFDP for the original purchase price, plus the shepherd's salary and interest (in this scenario, APFDP breaks even and shepherd reaps any profit or loss). If the shepherd declines, the lambs will be sold in the marketplace, with APFDP receiving any profit or loss. The shepherd bears no risk, but is motivated by the potential profit to do a good job raising the lambs. The chief risks for APFDP — a shepherd that proves incompetent or a steep decline in the lamb market between April and October — are both unlikely.

Recommendation 10: With villagers, develop livestock production and grazing plans that reduce grazing pressure on erosion-prone terrain near villages.

Villages like Shengjergj keep many animals overnight in villages year round. This places high grazing pressure on grazing land near villages, as animals can only travel a few kilometers from a village and be able to return that evening. As a result, erosion worsens, less desirable plants dominate vegetation, and grazing capacity declines.

Dairy cows are kept close to villages for daily milking and milk-processing needs. Several flocks of sheep — mostly ewes without lambs — and goats, some used for dairy, were also observed near villages. Villagers have good reasons to keep these animals close to home, but creative solutions are needed to enhance pasture grazing capacity and reduce erosion.

It is essential that grazing on pastures near villages be controlled to maintain adequate vegetative cover that reduces erosion and permits adequate regrowth after each grazing period to ensure the health of grazed plants. If villages have the right and enforcement power, they could outlaw summer grazing by non-dairy animals on these lands. Use of force, while undesirable, may be needed if other solutions cannot be agreed on. Alternatively, a fee could be charged for each non-dairy animal to graze. Fees discourage excessive numbers of animals, and the money raised can be used for pasture improvements.

One possibility is to allow animals to graze full time in summer mountain pastures, as described in the previous recommendation. Yet another option is to develop zero-grazing programs for dairy cows, including feeding the animals high-quality hay (alfalfa cut at first bloom) and grain instead of grazing and distributing the manure on gardens and private crop land or using it for composting. Developing a summer dairy industry around Biza would help resolve the problem in several ways. In addition to removing dairy cows from grazing land around Shengjergj, it would result in more grazing and nutrient recycling in pastures near Biza. If the peak milking season is timed to coincide with prime grazing around Biza, the amount of hay needed during winter would be lessened, saving labor, transportation, and money. Previous recommendations to increase legume concentration and improve grass types on Biza pastures gain added importance if dairy cows were moved to graze directly in these areas. An assistance program to improve facilities for handling milking and processing may be needed, which APFDP could coordinate. Other cooperators, such as Land O'Lakes, would probably be needed to conduct feasibility studies and provide technical assistance.

Recommendation 11: Limit pasture fertilization with nitrogen to hay land relatively close to storage facilities.

Nitrogen fertilizer usually increases grass yield 20 to 30 kg dry weight/kg of actual nitrogen (N) applied, when rates are between 50 and 150 kg N/ha and other factors, including moisture, nutrients, and pests, do not cause major growth limitations.

Although nitrogen fertilizer is expensive for many farmers, it can be used economically when the extra growth it produces is harvested efficiently, as hay harvest efficiency is often more than twice as great as grazing. This extra growth can be used to reduce other expenses, such as an expensive hay harvest or transportation from more distant locations.

Recommendation 12: For saline pastures like those near Spitall, re-seed to plants more tolerant of soil limitations.

Comprehensive soil sampling and testing are needed to determine the severity of salt inhibition and identify other production barriers that may exist. Many cultivated plants grown, such as wheat, are not highly salt-tolerant. Nevertheless, numerous species of grass, as well as certain legumes and woody species, tolerate high levels of salt and are more productive and desirable than existing natural vegetation.

With a water table within 2 meters of the soil's surface and only occasional frosts, the soil's potential productivity may be high. After the best options are identified — some plants with winter and spring growth are probably desirable as well as some deeply rooted summer species — a comprehensive program should be developed to re-seed economically. Besides the soil's salt content, other agronomic challenges that must be overcome are timing sowing to enhance moisture, controlling competing species, ensuring the structure of the soil, if tilled, as well as drainage and long-term maintenance issues.

Recommendation 13: Plan cropping systems on private lands to maximize crop rotation benefits.

Alfalfa and maize are good rotation partners: alfalfa improves soil structure and adds nitrogen to the soil needed for maize production. But maximum soil improvement usually occurs within three to four years after sowing alfalfa. The only benefit in maintaining older stands is reducing the cost of establishing the alfalfa. This advantage is often offset by lower production from old alfalfa stands and less opportunity for maize to take advantage of soil improvements when alfalfa occupies the field for extended periods of time.

Recommendation 14: Work with farmers to develop alternative livestock production systems that match animal nutrient needs cycles with opportunities to obtain the nutrients through grazing.

In most current livestock production systems for small ruminants, animals give birth between December and March. This forces animals to rely on hay and concentrates during the time of lactation and peak nutrient demand. By selling lambs and kids around April, most of the high-quality pasture available during spring is consumed by animals with relatively low nutrient concentration needs. Delaying birth by several months and raising lambs and kids on pasture until autumn could lower production costs — especially if less concentrate is used — and lessen the labor needed to harvest and feed hay, as less hay and concentrate will be needed during winter than under the current system, in which animals give birth in early spring.

To achieve success, factors like market timing, labor use, grazing management, feed, and cash flow must be effectively coordinated to fit within the total production system of the family and the farm. APFDP can stimulate innovative thinking by brainstorming with farmers on various options, followed by undertaking a serious systems analysis, including social, economic, biological, and physical factors, to test feasibility of options.

B. Training

Recommendation 1: Carry out cooperative training for staff from MOAF, APFDP, NGOs, and other agencies involved in pasture development.

Technical expertise in animal husbandry appears to be readily available in Albania. The network of livestock and veterinary specialists, both public and private, that exists throughout the country is a

significant and valuable resource.

However, similar skills in pasture husbandry are not as common. Aside from a handful of pasture specialists in MOAF and AUT, as well as a few livestock specialists with experience in pastures, Albania lacks experts with good technical knowledge in pasture husbandry.

Along with the lack of experienced, trained pasture specialists, many organizations need more expertise in pasture improvement and use. Existing internal expertise — and, if needed, external expertise — must be efficiently used to carry out training to help develop greater competence throughout the country.

APFDP should encourage development of human resources to support farmers' current and future pasture improvements. It can lead the way by using APFDP staff planning and training skills to organize cooperative training with various groups and organizations. This, in turn, will help train APFDP staff in pasture-husbandry techniques, increasing staff ability to work with farmers on projects, as well as its capacity to cultivate collective problem-solving among groups and organizations.

Risks include incomplete understanding of systems' social, physical, biological, and economic aspects by trainees and trainers alike, along with the likelihood of inconsistent recommendations from different groups. When recommendations conflict, farmers will often not trust or follow any of them — unless those making the recommendations acknowledge differences in opinions and explain the basis for the differences to the farmers. This allows farmers to more knowledgeably match personal needs and conditions with the appropriate recommendation.

Recommendation 2: Increase expertise of APFDP staff, especially the HPI representative, in pasture and livestock husbandry.

Farmers working directly with APFDP expect staff to be able to answer their questions. But pasture improvement is a new area of effort for APFDP as well as for many cooperating farmers. Therefore, expertise in the area needs development.

Specifically, expertise in animal nutrition should be combined with similar skills in grazing and pasture management and forage quality to understand and support farmers' needs. Options include APFDP's hiring an individual with such expertise, developing expertise internally by obtaining literature and training for designated staff, or contracting or cooperating with another agency or organization for the support.

Recommendation 3: Enhance farmer understanding and use of animal nutritional needs.

Basic knowledge of animal nutrition appears low, especially concerning annual production cycles within animals such as lactation, maintenance, and re-breeding, including insemination and conception. As the genetic-production level and potential of animals increase, diets must become more accurate — and adjustable — to use feed resources efficiently and avoid production problems. This training should be provided in line with the following recommendation.

Recommendation 4: Enhance farmer knowledge of nutrient concentration in common feedstuffs, especially hay and grazing land, and the factors that influence it.

Traditionally, farmers have used grain concentrates when livestock needed more energy; farmers often included alfalfa to meet protein requirements, perhaps without even understanding the energy and protein concentration of these feedstuffs. However, discussions with farmers revealed great interest in yield and bulk, but little appreciation for how they could manage pastures, especially hay land, to provide high-quality nutrients in a form that animals could use more efficiently.

Recommendation 5: Increase farmer understanding and ability to use basic plant growth principles to guide grazing management.

Grazing management systems must be flexible and dynamic to adjust to change. A knowledge of basic plant growth principles should guide these adjustments.

APFDP should provide training to farmers on various grazing strategies, like continuous and rotational stocking, zero grazing, and management-intensive grazing. Added training is then needed on basic plant growth: photosynthesis, the role of leaves and roots, the effect of temperature, moisture, nutrients, and pests on growth, the impact of grazing, and plant communities and diversity. With this knowledge as a base, more complex concepts can be introduced, including water and mineral cycling, energy flow, and succession within the context of grazing management and the plant/animal/soil system.

Recommendation 6: Develop publications on pasture and animal topics for cooperating farmers.

To learn new techniques, farmers need multiple presentation methods and readily available information. Although APFDP has expertise in face-to-face, hands-on, and demonstration training, it lacks the human resources to provide personal attention whenever a farmer needs it.

Leaflets with simple instructions and illustrations of standard techniques and topics can support individual training and provide at-home references for farmers. Such leaflets, which should be brief, should complement existing livestock production manuals, providing an explanation for why certain practices are recommended. Since the entire family is usually involved in a livestock enterprise in Albania, efforts are needed to write publications for women and children as well as for men, and ensure distribution to all groups. Some publications may even be targeted specifically to children, possibly for use in schools as well as at home.

Recommendation 7: Develop farmer group self-sufficiency and self-improvement by organizing and encouraging interaction among farmers using pasture walks and self-determined on-farm research.

Farmers often learn best from sharing personal experiences. APFDP should create a community of learners by inviting farmers to show their pastures to others in their group or village and use the occasion for problem-solving, training, and socializing.

These events should be scheduled regularly, with each farm family in the group having an opportunity to show their pastures and demonstrate their hospitality. APFDP representatives need to be present during the first two or three walks to guide observations and discussion toward identification of good conditions and problem-solving, while helping groups avoid negative behavior like boasting, complaining, or derogatory comments. Once farmers are familiar with the process and trust each other, they can conduct walks without supervision.

As pasture problems are identified, many potential solutions may emerge, with the best choices not

obvious. With possible support from APFDP, various farmers can test several attractive solutions, which can be used as demonstrations or for observation by other farmers with little risk of financial loss or ridicule for failure. Successful options can be rapidly incorporated into the production enterprise by all members of the group.

Training packages. Comprehensive training packages were developed on 1) principles of pasture plant growth, 2) grazing management, and 3) basic animal nutrition, feeding, and forage quality. Descriptions of the training packages are provided in Annex A. These packages were designed to provide guidelines for training farmers as well as APFDP and other agency and organization staff. Participatory exercises are used extensively as part of the training process.

The packages provide thorough, in-depth instruction. Therefore, it is critical that the knowledge level of trainees be assessed prior to using the packages. For trainees with more formal education — for example, livestock specialists — parts of the sessions may be too basic, although a quick review to guide trainees toward learning objectives may still be a valuable use of training time. For trainees with a minimal prior training, the packages should be simplified to permit trainees to learn at a comfortable pace. But training should still be sufficiently thorough to enable trainees to improve their production practices and lives. Given the variable background of potential trainees, training time estimates have not been made.

Each package is constructed to serve as a complete course, with information in each session building on knowledge gained from prior sessions. However, some sessions can be used for stand-alone training with minimal modification. And, sessions can be combined when the learning rate is high and time is available. When weeks or months pass between sessions, previous sessions should be briefly reviewed before beginning a new session, with trainees relating recent experiences or in other ways participating in the review discussion. It will often be desirable to modify sessions to focus on recommendations in this report. For example, the superior protein content, rate of digestibility, and animal intake of legumes could be emphasized during the course on animal nutrition to encourage greater use of legumes in pastures.

Specific reference materials have only been provided for the course on grazing management, and then only because the listed references form the basis for this report's recommendations on grazing. Although these references have been translated into various languages, they are probably not available in the Albanian language. But they are likely to be available in Italian, Spanish, German, and French. Other reference materials should be available from AUT — despite the destruction of its library — and MOAF.

One initial challenge in delivering training may be a lack of Albanian-speaking trainers with both the required technical competence and skill in participatory training methods. To overcome this constraint, it may be useful to use a team-teaching approach, at least until individuals develop sufficient technical and training-method skills. One benefit of this approach is that trainers will also be providing training to each other in their respective skills as they conduct the sessions.

C. Long-Term Strategic Planning Recommendations

Pasture improvement and use requires continual local reinforcement by well-trained specialists. Single training sessions rarely result in major changes in farmer behavior. In addition, awareness must be built throughout Albania's agricultural and natural resource sectors of the importance of pastures to the country's economic and environmental well-being.

On APFDP's side, the program must critically evaluate its mission and resources to avoid over-commitment to a large number of programs. The program's goals for policy development and training in land transfer, forests, livestock, and pastures are comprehensive and well-integrated. However, APFDP cannot do it all: Some responsibilities may need to undergo planned transfer to other agencies or organizations.

•Recommendation 1: Encourage extension services to include pasture specialists as one of their disciplines and help coordinate training with other agencies and organizations.

To succeed, many forestry and livestock enterprises run by farmers and the government depend on efficient, economical, and environmentally beneficial pasture use. Farmers need technically competent advisors to help them accomplish their objectives, but few such advisors are available in Albania. Those that do exist often lack disciplinary recognition since many are associated with forestry.

STOAS, a Dutch company, started developing an extension service for Albania in 1993. Other extension development efforts may also be under way or planned. Regardless of the source, site, and structure of this organization, the objectives of both APFDP and Albania as a whole will be furthered through a greater availability of pasture specialists.

Recommendation 2: Develop an intern program with AUT to increase pasture awareness, enhance general knowledge of pasture management among students, and develop future pasture specialists.

Hands-on training and field experience are two of the best, most rapid ways to increase expertise in any discipline. Final outcomes are best when this training is guided by technically competent professionals who can accurately answer questions and help solve problems.

AUT has educational programs and expertise in pastures, along with a mission to train students to contribute to Albania's development in their chosen field. But AUT lacks resources in the field to enhance student expertise in pastures. APFDP could help place students with farmer groups to answer questions, support on-farm research, conduct pasture walks, and learn about real-world problems and possible solutions.

ANNEX A

Training in Principles of Pasture Plant Growth

Pasture Plants

Session 1: What types of plants grow in pastures?

Objectives: By the end of this session, the trainees should be able to:

- Describe differences between grasses, legumes, forbs, and brush/trees
- Understand annual, biennial, and perennial lifespans
- Identify plants within all the above categories

Trainer note: This session should help trainees understand that plants are not all alike, and can be grouped into categories.

Procedure:

1. Trainees list names of plants that grow in their pastures. Have pictures, dry mounts, drawings, or live examples of as many as possible. Trainer add to list as needed.
2. Trainer describes general characteristics of grasses, legumes, forbs, and brush/trees.
3. Trainees divide list of plants into four groups with aid of trainer as needed.
4. Trainer describes lifespans, including advantages and disadvantages for the plant, the farmer, the soil, and the animal.
5. Trainees divide list of plants into lifespan groups.

Session 2: How do plants grow?

Objectives: By the end of this session, the trainees should be able to:

- Describe germination and stages of seedling development
- Name the major vegetative plant parts
- Identify methods of plant reproduction and survival
- Describe role of sunshine, water, CO₂, temperature, and minerals in photosynthesis and growth
- Describe the function of major plant parts

Trainer note: Understanding the role of various plant parts in growth will help trainees make wise decisions later managing their pastures.

Procedure:

1. Trainees view seeds and young seedlings of a grass and a legume at various stages of germination and development.
2. Trainer explains germination and seedling-emergence process.
3. Trainer shows examples of major plant parts — including roots, rhizomes, stolons, leaves, stems, tillers, and seedhead — using familiar plants from session 1.
4. Trainer explains photosynthesis.
5. Trainees determine how each plant part contributes to growth and reproduction with guidance

from the trainer.

Session 3: What factors affect plant growth?

Objectives: By the end of this session, the trainees should be able to:

- List environmental and biological factors that affect plant growth
- Understand how seasons affect plant growth
- Describe how pests reduce plant growth and discuss ways to overcome or avoid pests

Trainer note: Recognizing limitations to plant production and growth will help trainees identify ways to improve the productivity of their own pastures and reduce production inefficiencies.

Procedure:

1. Trainer reviews role of sunshine, water, CO₂, temperature, and minerals in plant growth.
2. Trainer describes how low light, drought or flood, heat or cold, and soil-nutrient levels change the growth rate of different types of plants.
3. Trainees describe how these factors affect their pastures, with special focus by trainer on changes tied to seasons of the year.
4. Trainees name pests in their pastures, such as diseases, insects, and weeds.
5. Trainer describes how different pests lower plant growth by infection, competition, interference, defoliation, and other strategies.
6. Trainees discuss ways to reduce problems from pests.

References: Basic textbooks used at AUT.

Grazing Management

Session 1: How does grazing affect plant growth?

Objectives: By the end of this session, the trainees should be able to:

- Estimate plant-growth rates under given weather and plant-status conditions on a relative basis
- Predict changes in root nutrient-storage levels
- Describe how grazing affects above and below ground growth
- Understand how grazing severity and growing conditions affect recovery time
- Define overgrazing

Trainer note: This session integrates many principles of plant growth with defoliation, identifying conditions when plants are ready or not ready for the stress of grazing.

Procedure:

1. Trainer reviews plant growth and answers questions.
2. Trainer describes plant-growth rate as a sigmoid growth curve with initiation, accumulation, and plateau phases, emphasizing relationship with leaf area to capture and transfer the flow of energy from sunlight into plant tissue.
3. Trainer introduces the concept of nutrient storage in roots and conditions, including weather effects on growing conditions, when the storage level increases or decreases, emphasizing the interaction of defoliation severity and recovery time.

4. Trainees determine direction of nutrient-level changes in roots from examples given by trainer.
5. Trainer defines overgrazing as an individual plant process, which has a worsening effect on plant health and vigor as it is repeated over time; trainer gives examples.
6. Trainees discuss how overgrazing occurs and how it affects animal performance.

Session 2: How does plant type affect response to grazing?

Objectives: By the end of this session, trainees should be able to:

- Rate plant tolerance to grazing by plant morphological characteristics
- Understand the concept of selective grazing and how it can affect regrowth
- Understand the value of diversity in plant communities
- Describe how plant morphological characteristics and selective grazing can affect plant communities
- Identify sites where growth or regrowth occurs on pasture plants (meristems/growing points) and how grazing influences this activity

Trainer note: Differences in regrowth capacity is a major reason why grazing must be carefully managed to protect the production capability of grazing land.

Procedure:

1. Trainer describes the concept of diversity and plant communities.
2. Trainer rates pasture plants for different structural characteristics — like basal leaves and plant height — that affect plant tolerance to grazing. Trainer guides trainee discussion on plants grazing potential and regrowth rate after grazing.
3. Trainees list plants that animals prefer to graze and plants they dislike grazing, developing with trainer guidance a definition of selective grazing.
4. Trainer reviews plant structure, adding apical meristem and other growing points.
5. Trainees dissect grass plants to locate position of apical meristem and view its appearance (wheat plants, from early jointing stage of growth through boot stage, easily show changes in apical meristem position and its transition from vegetative to reproductive).
6. Trainer describes sites of regrowth based on fate of the apical meristem during grazing, comparing rate and site of regrowth of different pasture plants.

Session 3: What methods of grazing help maintain plant health, productivity, and communities?

Objectives: By the end of this session, the trainees should be able to:

- Explain how continuous stocking and free grazing harms plants and lowers animal production
- Describe benefits of rotational grazing and the importance of planning
- Be anxious to try rotational grazing and develop skills

Trainer note: By the start of this session, trainees should anticipate the type of grazing management needed to enhance their grazing land and improve livestock production.

Procedure:

1. Trainees discuss current grazing methods, especially continuous stocking and free grazing. They define overgrazing and identify its harmful effect on plant communities and livestock production.
2. Trainees brainstorm ideas on how to overcome the harmful effects of continuous stocking/free grazing.
3. Trainer explains planned rotational grazing, emphasizing the value of controlled recovery time.
4. Trainees discuss how rotational grazing can be done on their pastures, focusing on private pastures but including discussion of community pastures and the added problems in controlling grazing in those areas.
5. Trainer describes other advantages of rotational grazing — such as uniformity of grazing and nutrient transfer, weed reduction, and extended periods of good grazing — and identifies challenges, including availability of water for livestock, controlling animal grazing behavior and location, developing personal discipline and motivation to stick with a management plan, and building skill and confidence to adjust to changing conditions.
6. Trainees discuss options to overcome challenges among themselves and within families.

Session 4: What indicators can I use to guide my decisions on grazing management?

Objectives: By the end of this session, the trainees should be able to:

- Describe the four cornerstones of grazing-land health
- Identify indicators for each cornerstone
- List causes and remedies for various problems

Trainer note: Farmers need to know which indicators can help them make decisions on moving animals and assist in evaluating changes in the health of their land.

Procedure:

1. Trainer describes water cycle, mineral cycle, energy flow, and succession.
2. Trainer lists indicators of healthy conditions for each cornerstone: erosion and water absorption for water cycle, litter and manure for mineral cycle, leaf area and plant maturity for energy flow, plant community diversity, and abundance of “best” plants for succession.
3. Trainees discuss why each indicator is important.
4. Trainer describes the role on indicators and cornerstones of such factors as stock density, animal impact, length of grazing and recovery periods, fire, stocking rate, and technology issues including tillage, fertilization, seeding, pest control, and hay harvest.
5. Trainees evaluate nearby pastures and discuss areas for concern regarding plant and land health, speculating on ways the problems may have developed and identifying ways to remedy the problems and enhance plant and land health.

References:

Grass Productivity, by Andre Voisin.

Holistic Resource Management, by Allan Savory.

Basic Animal Nutrition, Feeding, and Forage Quality

Session 1: What is a nutrient and what does it do?

Objectives: By the end of this session, the trainees should be able to:

- Define and list nutrients for animals
- Describe the role of major nutrients in animal diets
- Understand relative animal requirements of major nutrients

Trainer note: Farmers must realize that animals need different nutrients for different purposes.

Procedure:

1. Trainer describes nutrients like water, protein, and energy.
2. Trainees identify ways that animals use nutrients, including maintenance, lactation, pregnancy, growth, and work.
3. Trainer lists nutrient requirements by animal for various functions, especially relating to meat and milk production.

Session 2: How do nutrient requirements of animals change during their lifespan?

Objectives: By the end of this session, the trainees should be able to:

- Identify phases of animal growth and development
- Describe changes in nutrient demand caused by these phases
- Determine consequences of failing to meet nutrient demands

Trainer note: Farmers should learn to adjust feeding practices to changes in animal nutrient requirements.

Procedure:

1. Trainees discuss changes in animals as they grow older or bigger, as well as annual changes in female livestock.
2. Trainer quantifies changes according to nutrient demand.
3. Trainer describes animal response to insufficient levels of various nutrients during different phases of growth and development.

Session 3: What nutrients do various feedstuffs supply to animals?

Objectives: By the end of this session, the trainees should be able to:

- List feedstuffs according to their relative ability to provide livestock with protein, energy, and other nutrients
- Identify nutritional strengths and weaknesses of various pasture plants
- Develop simple, but accurate, rations for livestock

Trainer note: This session prepares farmers to develop feeding practices that efficiently use the nutrients in available feedstuffs.

Procedure:

1. Trainees develop a list of feedstuffs that are usually available for their animals.
2. Trainer uses this list to describe the nutrient content of each feedstuff, adding other feedstuffs that may be needed for completeness.
3. Trainer describes how to balance rations.
3. Trainees construct feeding rations that are balanced for major nutrients, including protein, energy, calcium, and phosphorus, using commonly available feedstuffs.
3. Trainer focuses attention on pasture plants, pointing out how fiber affects intake potential and the plants' ability to supply nutrients, compared to concentrates, grains, and supplements.

Session 4: Why do pasture plants vary in nutrient content?

Objectives: By the end of this session, the trainees should be able to:

- Identify environmental and cultural factors that change nutrient content of hay and grazing lands
- Adjust feeding practices based on factors influencing nutrient content of feedstuffs, especially pastures
- Suggest ways to change animal husbandry, grazing and hay management, pasture composition, and supplementing to match animal-nutrient requirements with nutrients contained in the feedstuffs available

Trainer note: Efficient and economical feeding practices require ability to adjust rations based on changes in feedstuff composition and animal requirements.

Procedures:

1. Trainer reviews plant growth and structure, describing how nutrient-concentration changes as pasture plants develop and mature.
2. Trainees describe how plants change during the seasons and how variation in temperature, rainfall, pests, and soil fertility affects growth.
3. Trainer explains how changes in plant growth and metabolism and changes in growing conditions also affect nutrient concentration.
4. Trainer identifies cultural practices — especially concerning plant maturity when cut for hay or grazed, but also factors like fertilization, irrigation, legume seeding, and grazing severity — and describes how these practices change nutrient content.
5. Trainees estimate differences in milk and meat production from examples of hays of different forage quality and nutrient concentration. They then brainstorm on management suggestions to adjust to and control these differences, including modifying rations, improving pastures and pasture management, and harvesting hay when plants are at the proper maturity to satisfy animal nutrient requirements.
6. Trainer describes alternative production systems, incorporating ideas of trainees with other options, especially those suggested by APFDP.

References:

Various textbooks and other resources on animal nutrition and forage quality at AUT.