MODULE 5:

IMPROVING HOW VETERINARY PRODUCTS ARE USED

EDUCATIONAL OBJECTIVE:

Be able to prevent risks associated with the use of veterinary products and recommend livestock farming practices and ethno-veterinary treatments that help to reduce the use of such products in accordance with the "One Health" approach.

TOPIC 1:

Know the types of livestock farming practiced by training participants and their situations as well as the primary pathologies present in these environments.

To conduct a detailed analysis of the conditions of access to and use of veterinary drugs by livestock farmers, please refer to Module 1 **"Preliminary participatory diagnostics"**of this guide. Some issues specific to the field of livestock and animal health are recalled here:

- Do farmers have frequent access to veterinary products (antibiotics and antiparasitics in particular) and can we say that the way these products are used leads to problems in the areas concerned? If so, identify, together with participants, improper practices involving the use of medicines *(adequacy of treatment for diagnosis, dosage and administration, observance of waiting periods...),* of storage or disposal of vials and packaging. The task is also to assess how well pathologies and treatment methods are known in order to prepare the following training activities.

- Where are they bought and how much do the most commonly used products cost? Are some products purchased via "illicit" channels or on uncontrolled markets? In particular, are some of the products used not authorized in the country *(particularly those whose labels are not in an official language and therefore cannot be read by farmers or even technicians)?*

- Who are the health stakeholders in the areas concerned *(CAHW or other types of stakeholders, veterinary para-professionals, livestock technicians, private or public veterinarians, etc...)*? Refer to the village survey guides mentioned in topic 2 of Module 1.

- Do these health stakeholders participate in training and can they be mobilized for the following planned activities?

TOPIC 2:

Understand the "One Health" approach and why it is needed for more sensible use of antibiotics and anti-parasitic products.

a. Presentation of the One Health approach.

This concept was developed in the early 2000's and promotes **an integrated, systematic and unified approach to public, animal and environmental health at the local, national and global level.** The One Health approach [53] encourages collaborative, multi-sectoral and transdisciplinary approaches to developing new strategies for disease prevention and control. Though it originated in the United States, the idea of a unified vision of health and the importance of the environment has ancient roots that date back to early Greece. Antibiotic resistance is a key issue in the One Health approach and more broadly the development of resistance to treatments *(in pathogens: bacteria, parasites, etc...)*. These resistances represent a serious threat to animal and human health.

b. Within the context of this approach, **why worry about the harmfulness of "improperly used"** veterinary products (particularly antibiotics, but also antiparasitics including insecticides)?

Improper practices in connection with the use of veterinary drugs (use of a product that does not suit the pathology due to lack of established diagnosis, lack of technical support for the prescription, improper dosage, failure to respect waiting times for medications before use or marketing of the products, lack of traceability of the treatments *(identification of the animals, livestock register, ...)* contribute to the creation of the following problems for human and animal health and the protection of the environment:

1. A risk of antibiotic **or antiparasitic residues in foodstuffs of animal origin** *(in particular milk and meat)* consumed by farmers or consumers. While the prevalence of veterinary drug residues in foods of animal origin is estimated to be less than 1% in Europe, it may be as high as 80% in some African countries, according to a number of sources[54]. The presence of these residues in food of animal origin can have serious consequences in terms of **public health** by contributing to the development of allergies, cancers, changes in intestinal flora, bacterial and parasitic resistance and inhibition of fermentation processes in the dairy industry. This problem of microbial resistance has become a global issue for several years.

For the WHO: "Antibiotic resistance is one of the most serious threats to global health, food security and development today".

[53] Some documents for reference in regard to the One Health approach: https://www.avsf.org/fr/posts/2458/full/mise-en-oeuvre-du-concept-one-health-dans-les-pays-du-sud-policy-brief-de-vsf-international; https://www.AVSF.org/public/posts/2289/actes_AVSF-vsf-int_atelier_one_health_novembre_2018.pdf; https://www.AVSF.org/public/posts/2291/actes_atelier_national_one-health_AVSF_vsfi_mali_2019.pdf;

[54] Van Boeckel et al, 2015. Global trends in antimicrobial use in food animals, P Ntl A Sci 112, 5649–5654 et Résidus d'antibiotiques et denrées d'origine animale en Afrique: risques de santé publique [Antibiotic residues and animal products in Africa: public health risks], Rev. sci. tech. Off. int. Epiz., 2014, 33 (3), 975-986

2. The emergence of resistance and the resulting decrease in the effectiveness of treatments has the following effects:

- on human health, in particular potential resistance of germs that will then afflict humans and reduce treatment possibilities;

- economic effects due to increased losses for livestock farmers *(ineffective treatments, and, as a result, increased morbidity and mortality.*

Some examples of declines in the efficacy of pest control treatments can lead to fundamental restructuring of industries. This is the case with the resistance of strongyles (intestinal parasites) in sheep to anthelmintics, which is known in all sheep farming areas of the world. In Australia and New Zealand, 80% of sheep flocks exhibited multiple resistances in the 1990s, which forced some regions to restructure or even abandon sheep farming (this problem was also encountered in South Africa).

3. The dissemination in the environment of product residues which also contribute to the acceleration of the development of resistances and can have adverse effects on the environment, in particular on entomofauna such as dung beetles, highly beneficial insects which are killed by ivermectin, an active antiparasitic substance that is widely used around the globe.

Source https://fr.wikipedia.org/wiki/Ivermectine:
"Ivermectin is highly toxic to insects and aquatic organisms and poses additional fundamental ecotoxicological risks. Administered to cattle, sheep and horses, it is primarily eliminated in the feces with elevated concentrations in dung and droppings in the days following treatment. The duration of elimination in the feces of treated animals depends on how the medication is administered (intramuscular, bolus) and varies between **10 and 150 days**. Milk can also be contaminated. The highly adverse effect of ivermectin on non-target fauna (Diptera and coleoptera coprophages = dung beetles) has been established by numerous studies, even though the laboratory that markets it has published contradictory studies."

c. The issue of quality and availability of veterinary products.

The quality of the products used, which is all too often inadequate for both human and veterinary medicines, is further degraded by supplies outside the official channels. Thus, the percentage of non-compliant veterinary drugs found on the market *(formal and informal)* in West Africa could vary, depending on the compound and country, from 11 to 69%, according to various sources [55]. This observation is due to the lack of regulations governing the import, authorization and marketing of veterinary drugs, but also to a severe lack of resources for organizing controls to enable these regulations to be applied in the field.

For livestock farmers, purchasing poor quality medicines results in financial losses since the purchase cost is not compensated by the expected gain in the form of improved animal health and

[55] DOGNON et al., 2018, Qualité des antibiotiques vétérinaires utilisés en Afrique de l'Ouest et méthodes de détection de leurs résidus dans les denrées alimentaires (Quality of veterinary antibiotics used in West Africa and methods for detecting their residues in foodstuffs), Journal of Animal & Plant Sciences, 2018. Vol.36, Issue 2: 5858-5877.

productivity, as the active ingredients contained in counterfeit products are ineffective or even entirely absent.
Moreover, even in official distribution channels, the variety of products available on the market is often still insufficient for antibiotics, vaccines or antiparasitics.

d. Concrete measures that can be considered:

1. Train animal health workers and livestock farmers to make them **aware of good practices in the use of veterinary drugs** and, therefore, to create accessible training materials for this purpose.

In the specific case of antibiotics *(good practices in terms of the use of antiparasitics are described under topic 3 below)*, these materials could be inspired, illustrating them in a concrete manner, by some of the WHO recommendations for the agricultural sector regarding the prevention and control of antibiotic resistance:

- give antibiotics to animals only under supervision/advice by a veterinary professional;
- do not use products from uncontrolled markets and strongly encourage procurement through official distribution channels for veterinary drugs;
- do not use antibiotics as growth promoters or to prevent disease in animals;
- to reduce the need for antibiotics, use alternatives to antibiotics where available, including creating a vaccination **protocol** that is appropriate for the zone based on recurrence and type of disease and providing for contingency measures in the event of an outbreak;
- promote and enforce sound hygienic practices at each stage of the production process and processing of food of animal origin;
- In case of a bacterial infection threatening life or the stability of the herd, seek professional advice on how to implement suitable, selective treatment *(by carefully selecting, to the extent possible, only animals to be treated for the pathology in question)*, and have antibiotic susceptibility tests performed if such techniques are available *(which continue to be rare in certain contexts)* in order to use the most suitable drug possible.
- to raise awareness for post-treatment waiting times for the consumption and processing of animal products;
- increase biosecurity on farms to avoid infections by improving hygiene and animal welfare *(cf. topic 3)*.

Ideally, these training courses should be accompanied by follow-up to assess the effective change in the practices of the trained persons, either in the form of mentoring or feedback sessions "removed" from the training.

2. Better individual and collective management of waste (bottles, injection materials), of veterinary products to limit the intentional or unintentional discharge of these products into the environment, and even cross-contamination between animals in the case of the implementation of treatments. Examples of measures that could be implemented:
- at the individual level, raising of awareness among livestock farmers to the management of "bottle ends" and injection materials;
- provision of containers for the recovery and treatment of this type of waste;
- setup of networks for the recovery and treatment of such waste by medicine suppliers or other stakeholders , including those from the field of human health, to be identified.

3. Promote alternatives based on traditional knowledge and outside knowledge of herbal medicine or aromatherapy *(if quality essential oils are available and affordable - see Topic 4).*

4. To support official authorities with **implementing regulations on the control** of the sale of veterinary drugs, and to encourage and support the **development of distribution** channels of quality drugs to farmers in rural areas *(veterinary warehouses...)* in compliance with local regulations and the structuring of the existing animal health network.

TOPIC 3:

Identify and implement herd management practices that reduce the need to use veterinary products.

Can we completely eliminate the need for medications? No, but we can establish, depending on the context, livestock farming practices that limit health risks or promote improved animal resistance:

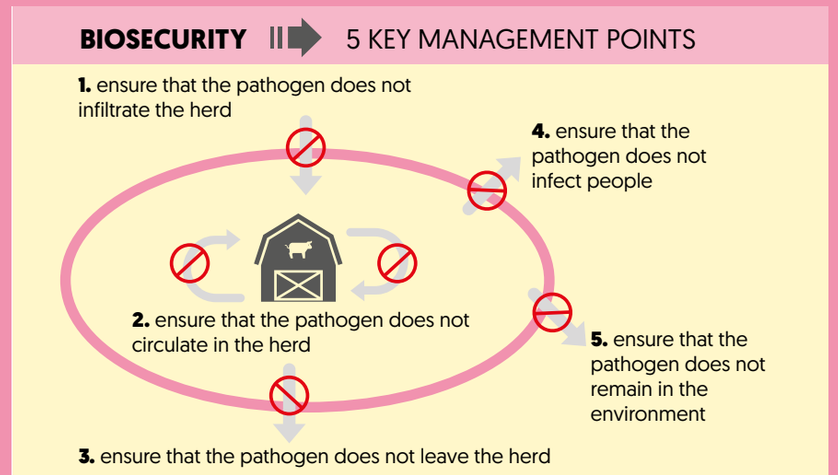
1. **Choose hardy breeds** and/or make selections based on hardiness and resistance to certain pests or diseases
2. **Reduce stress** as much as possible by establishing favorable livestock farming conditions, for example by avoiding the formation and reformation of groups by mixing animals of different origins, avoiding transport in extreme climatic conditions, noise and excitement, various forms of abuse...
3. **To provide quality feed in accordance with** the physiological needs of the animals according to the species, breeds, ages and expected production, and taking into account the plant species *(including fodder)* available locally, taking care to avoid food competition with humans *(especially for monogastric species)*.
4. **Cultivate the natural resistance of animals** to parasites through initial care for newborn animals *(quality colostrum intake)*, semi-foraging, grazing of animals from a young age to allow them to develop their immunity, etc...
5. Develop and implement biosecurity measures in livestock farming *(cf. focus a)*).
6. Implement integrated management measures to reduce contamination, particularly by parasites .
7. Implement, if necessary and depending on the context, **well thought-out vaccination plans** and use simple advance diagnosis to limit the risk of epizootics

Concrete measures that can be considered

a. Focus on biosecurity in livestock farming

Useful clarification in some working contexts: most of the biosecurity measures described below cannot be applied to pastoral livestock farming. In these situations where there is no livestock building, the measures that can still be applied are specified at the end of the section.

Biosecurity refers to all preventive measures aimed at reducing the risks of introduction, spread and transmission of infectious diseases.
Depending on the species raised and the livestock farming method (in buildings or not, with transhumance or not...), the applicable, prioritized biosecurity measures can vary greatly, but it is important to keep them in mind to limit the risks of introduction, and thus to limit the use of veterinary drugs. The accompanying diagram summarizes the biosafety concept.



We can distinguish:

1. External biosecurity, which aims to prevent and/or limit the introduction into farms of new microbial, viral or parasitic strains from various possible sources*(the environment, wildlife, introduced animals, shared equipment, humans, see diagram below).*

Possible sources of contamination	
Living	**Non-living: "inert"**
- the animal itself - the introduction of young breeding stock - humans (livestock farmers or other visitors from outside the farm) - surrounding fauna: mammals (including rodents) or wild birds, insects, other domestic animals (dogs, cats...)	- vehicles - equipment/material, surfaces on the premises - air - food, water, distribution systems - manure, dung - foodstuff (meat, milk, eggs...) or by-products - sperm (insemination)

When it comes to external biosecurity, the following measures are critical:
- Reduce the number of animals of different origins introduced into the farm; in particular, reduce the number of purchases and trades, increase in-herd replenishment as much as possible.
- Quarantine new animals purchased before they come into contact with the herd to ensure that they are not ill.
- Avoid **direct contact** (through habitat adaptation, fencing, etc.) with wildlife, and avoid contact of wildlife with feed (forage, grain, etc.) for domestic animals.
- Limit direct contact with animals from other neighboring herds *(e.g. during watering, or by organizing vaccination drives or other gatherings).*

2. In-farm biosecurity, consisting of measures to reduce the spread of germs within the farm:

- Isolation of **sick animals** from the rest of the herd to avoid contamination.
- In case of mortality, do not allow other herd animals or other animals *(dogs...)* to come into contact with **carcasses**, destroy the carcasses in a suitable manner *(bury the carcasses, process by composting small carcasses or incinerate them).*
- Proper management of **effluents** (storage to avoid direct runoff into waterways, composting of manure before spreading).
- **Clean and disinfect** materials *(particularly if they have been shared with other livestock farmers)* and the premises regularly.
- Use **protective** equipment when handling sick animals, or at least wash hands thoroughly after handling a sick animal. Preferably, start care *(feeding, change of litter etc...)* with the healthy animals and finish by taking care of the sick animals.

In **a pastoral context**, the most important biosecurity measures that should be taken to the greatest extent possible are (i) isolation of sick animals, (ii) limiting access to carcasses, and (iii) limiting contact to animals from other herds, in particular in organizing access to water points or during the organization of vaccination drives, in connection with certain measures developed by AVSF on conflicts of use.

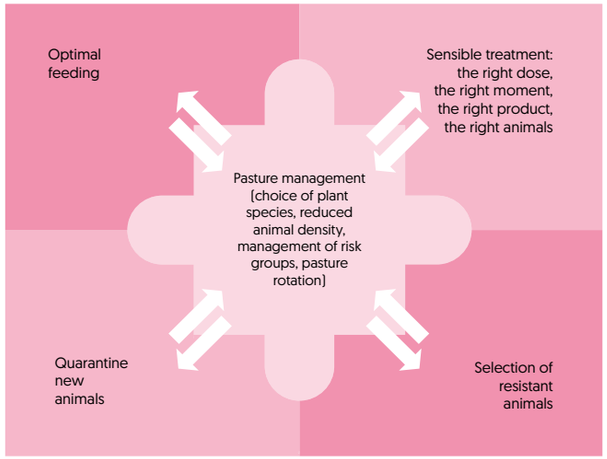
b. Implement integrated management measures to reduce contamination, particularly by parasites (cf. focus b).

To limit the risk of infestation by internal parasites that have important consequences in terms of animal growth and production, the main sound grazing practices are as follows:

- Avoid continuous grazing and prioritize **rotational grazing** by allowing a period of about 25 to 30 days to pass before returning to a previously grazed area.
- Limit **overgrazing**: parasite larvae are found close to the ground; the more animals overgraze, the more larvae they will ingest.
- Move animals from one plot to **another before the first rains** at the end of the dry period when larvae concentrate in the dung in the absence of abundant grass. The arrival of rain will release and spread the infesting parasite larvae in very large quantities on the plots and contribute to widespread infestation of the animals.
- **Graze adults and youngsters simultaneously on the same plots** because the adults shed less *(except in isolated cases)* and will thereby reduce parasite pressure on the youngsters.

• If the herd is managed by age group, it is better to graze **young animals on plots previously occupied by adults** than by other young animals, as adults are less likely to shed larvae and eggs because of their acquired immunity.
• **Mix species when grazing** *(e.g., cattle and horses)* because they are not susceptible to the same parasites, and will mutually limit the parasite pressure of the other species by ingesting larvae but not shedding eggs.
• Use of plants or plant extracts with anti-parasite properties to limit the frequency of treatments *(cf. topic 4.)*

The following diagram[56] summarizes the pillars of integrated management of internal parasites to reduce the need for pest control treatments. Of course, depending on the context, breeding practices and the availability of pasture land, the feasibility of these practices must be discussed with the livestock farmers so that they can be adapted to their situation.



This strategy reminds us that in cases of heavy infestations where parasite control treatments cannot be avoided, it is advisable to apply **sensible treatment practices,**[53] which include good practices in the use of pest control products, such as:

• do not use products from uncontrolled markets;
• limit the number of treatments administered and, in particular, avoid systematic treatments;
• verify the effectiveness of the compounds used, if possible by analyzing the feces (coproculture) of a few animals before and after treatment; this may also allow more specific targeting of the animals to be treated (selective treatment of the biggest shedders) and avoid having to treat the whole herd systematically;
• change the active ingredient on an annual basis by seeking advice from a veterinarian or other animal health professional;
• during treatment, estimate the animal's weight as best possible and observe the recommended doses to avoid under- or overdosing;
• observe usage precautions, particularly for "pour-on" products for external application (among others, do not use in rainy weather to avoid contaminating the environment);
• do not abuse long-acting dewormers or continuous-release products (boluses);
• and above all, do not treat preventively but curatively, by implementing all other integrated management measures!

[56] Source: project "Maîtrise du parasitisme interne chez les troupeaux ovins utilisant les pâturages" (Control of internal parasites in sheep herds using grazing pastures), 2007, CEPOQ *(Centre d'Expertise et de Production Ovine du Québec).*
[57] 2013, Brochure of the Life Prairies Bocage project, "MIEUX RAISONNER LES TREITEMENTS ANTIPARASITAIRES DANS LES ÉLEVAGES" (A MORE RATIONAL APPROACH TO ANTIPARASITIC TREATMENTS ON FARMS)".

TOPIC 4:

Recover and disseminate relevant alternative traditional practices from the zones of training participants.

Ethnoveterinary practices consist of the traditional knowledge, skills, methods, practices and beliefs of people used to care for their animals. This concerns both diagnostic practices *(recognition and description of symptoms),* prevention and treatment, in particular through the use of medicinal plants, but not only *(use of substances such as honey, ashes ...)* and also zootechnical practices *(see Topic 3, choice of breeds, diet ...).* These practices can be very useful in the development of alternatives to allopathic treatments which may not be highly accessible (in terms of material or financially) or used in poor conditions, as described above.

More broadly, ethnoveterinary practices should not be considered only in terms of veterinary phytotherapy, but first and foremost be integrated into livestock practices in terms of technical management sequences **and agro-ecological food processes**, and even in terms of the culture and identity of the populations with whom we work. Thus, these practices are part of a multifunctional approach that must also be promoted. Moreover, the rational use of plants of medical importance *(including veterinary)* has the advantage of enhancing the value of these natural resources and enabling maintenance of biodiversity which, in certain agricultural contexts, is threatened.

One of the foundations of animal health is their diet, which for most species is mainly of plant origin. The addition, **in the food ration**, of plants whose properties offer the physiological benefits of strengthening or maintaining certain essential fundamental functions *(digestive, immune, respiratory, locomotor, reproductive...)* can be of great value without the drawback of potentially complex preparation of plant parts or which concentrates active principles and can involve problems of toxicity.

For example, from the point of view of proper healthy food diversity, the practice of natural selective grazing behavior by animals *(e.g., the animals themselves choosing certain forage species that have a natural anti-parasitic function)*, integrated pest management *(described above)*, root development without trampling and thus soil improvement *(and associated carbon storage)* are techniques often traditionally practiced by livestock farmers and which can be promoted and disseminated, all the more so since they are consistent with the maintenance of a transhumant way of life, characteristic of many contexts where such actions are developed. In more settled contexts, there is a strong interest in developing hedges that integrate forage species. Indeed, in addition to their importance from a biodiversity standpoint, water infiltration, runoff prevention, natural fences, they help enrich the plots with organic matter, and can be a source of forage particularly in times of drought when there tends to be a lack of grass.

Thus, for ethnoveterinary practices, there is both:
- the challenge of **collecting and conserving** these traditional practices *(knowledge and know-how)* which are often based on oral tradition and which may be disappearing in some regions;

- the challenge of **disseminating** the most tried and tested practices, to enable livestock farmers to preserve this know-how and to have access to diversified and effective livestock farming, prevention and treatment techniques.

The question of the "scientific" validation of phytotherapeutic practices and recipes remains a sensitive one, because the usual clinical test conditions of allopathic drugs are not well adapted to practices of this kind which, by definition, are not or are hardly standardized. Therefore, it is difficult to demonstrate effects related to the use of plant parts potentially containing several active ingredients, and whose concentration in active ingredients and efficacy are subject to many environmental factors *(seasons, method of preparation, uncertain dosages due to the imprecision of the measuring instruments...)*.

However, several studies have already been carried out to identify and promote ethnoveterinary practices, and this approach to documenting and popularizing certain proven practices warrants implementation in the countries/regions targeted by the training.

In **Appendix 6**, a table summarizes the documents produced as a result of this type of study within the framework of actions carried out by AVSF and/or its partners, referring, when the documents are available online, **to the detailed reports or outreach tools produced.** In the same Appendix 6, other examples of studies and bibliographical references are also cited, not exhaustively, as some studies not published online may be available depending on the country, as practices are by definition very much linked to the specific territory where one is located. Also as an example in a French context,**Appendix 12** presents a summary of phytotherapy and aromatherapy practices implemented in France on a cattle farm in Western France, and provides links to further information on the subject in the French and European context.

Ethnoveterinary practices should not be considered unique solutions and their inclusion and promotion does not mean abandoning "modern" veterinary medicine. **The two types of medicine can be used in a complementary way depending on the situation.**

Thus, in a certain number of cases, it is possible that one cannot completely do without veterinary drugs *(including antibiotics and antiparasitics),* particularly during acute or sub-acute pathologies. However, apart from using them correctly in this case *(see previous sections)* it is also possible, in a preventive manner, to improve their effectiveness or to reduce their use significantly by using plants. Moreover, there are no contraindications to using the two types of approach *(allopathic and phytotherapeutic)* concomitantly.
Moreover, the use of plants can be part of a preventive approach by helping to keep animals in good health and therefore better able to cope with infections. Thus, the objective of using certain plants could be to reinforce physiological functions *(metabolism, detoxification, immunity...)* and thus to reinforce animal capacities of adaptation and defenses, rather than to look for a strict curative aspect.

Raising the awareness of animal health network personnel *(such as Community Animal Health Workers - CAHWs)* of the value of some of these practices, and in the long term, strengthening the capacity of traditional practitioners as well as connecting them to other animal health professionals, could be addressed in the scope of livestock support projects.
Moreover, as for any "natural" preparation, one should not underestimate the toxic potential of certain plants used, and thus the precautions to be taken when using them. For example, in Ethiopia, goat farmers boil castor oil leaves *(Ricinus communis)* to obtain a viscous liquid that they use to control mange in their animals. The active ingredient, ricin, is highly toxic and the preparation must therefore be handled with great care *(Peacock, 1996)*.

It is also of utmost importance to trace the origin of the plants that will be consumed by the animals in order to avoid rendering toxic or hazardous plants that normally are not toxic but may contain other biological or chemical contaminants (plants from dumps, industrial wastelands or urban pollution, risks of contamination by human excrement, soils that are regularly or freshly treated with chemical fertilizers or phytosanitary products). This applies both to the collection of plants and to the direct grazing of animals in these risk areas.

Thus, it may be important to know and **reduce the impact of using pesticides on crops on animal health** , and in particular to avoid acute intoxication of animals grazing on plots of land that have been freshly treated with pesticides, by putting in place **a warning system advising herders of phytosanitary treatments** *(e.g., to reduce intoxication in the case of grazing on plots of land that have recently been treated with herbicides, cases cited in Mali relating to the practice of "common grazing land")*.

NOTES