

IMPORTANCE OF PASTURE FLORAL COMPOSITION IN SHEEP RAISING

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Abstract: This paper focuses on the importance of pasture floral composition in sheep raising. It presents the main factors to consider in pasture management: climate, floral composition, soil, terrain, and water supply. The floral composition of pastures has been one of the sheep feeding-related topics: biodiversity, floral composition of pastures, grazing systems, pastoral systems, pastoralism and conflict, pasture quality, and transhumance. The paper presents, in detail, the main types of pasture and hay forage crops for sheep (alternative/annual forages, cool season grasses, forbs/phorbs, legumes, and warm season grasses) currently found on Romanian pastures, and recommends a few mixtures of pasture and hay forage crops for sheep.

Key words: pasture, alternative /annual forages, cool season grasses, forbs / phorbs, legumes, and warm season grasses

INTRODUCTION

Pastures are the primary sources of food and nutrients for sheep, and pasture management can ensure safe grazing with minimum feed costs for the farmer and minimum damage to the pasture. To do so, farmers need to consider the following factors: climate [18], floral composition, soil, terrain, and water supply [10,14,15]:

- Climate can affect pasture growth and development through drought, moisture, temperature;
- Floral composition depends on climate and land conditions and should cover the needs of sheep (who can graze for up to seven hours a day);
- Soil allows grass to grow in adequate quantities; can ward off the growth of undesirable weeds and poisonous plants; may need fertilizing to improve soil fertility if the sheep do not do most of the fertilizing; needs testing in a lab for factors such as available phosphorous and potassium, Ph level, presence of salt and cations (calcium, magnesium, sodium); provides the groundwork for pasture management; [16,17]
- Terrain can affect livestock grazing behaviour and pasture development because of the instability of the terrain, of the level of terrain, of the location of the pasture, of the steepness of its slope, or of the unevenness of the terrain.
- Water supply is vital on pastures because the soil needs moisture to nurture crop growth and, if not enough, it can also affect the health of the flock. [1,4,17,24]

MATERIALS AND METHODS

The material consists in publications on the importance of pasture floral composition in sheep raising, with focus on the main pasture management factors and on the most common types of pasture and hay forage crops for sheep.

The research method, bibliographical, aimed at presenting, in a rigorous way, the main pasture management factors, the main sheep feeding-related topics, the main types of pasture and hay forage crops for sheep found in Romania, and a few mixtures of pasture and hay forage crops for sheep.

RESEARCH RESULTS

According to surveys, pastoral transhumance has existed since prehistoric times [3,6,9,19] and research has constantly aimed at improving animal husbandry practices with focus on sheep feeding-related topics: biodiversity [22,25,27], floral composition of pastures [7,11,23], grazing systems [8], pastoral systems [1,6,12,28], pastoralism and conflict [2,4,5,10,12].

1. Types of Pasture and Hay Forage Crops for Sheep

According to Undersander [26], “pasture and hay forage crops for sheep generally fall into four categories: alternative/annual forages, cool season grasses, legumes, and warm season grasses.” A fifth category is that of forbs / phorbs.

1.1. Alternative/annual forages “should be considered for sheep pasture only in emergency situations” and include: all annual forage crops: broomcorn / sorghum (*Sorghum* spp.), Sudan grass (*Sorghum* × *drummondii*), and various millets and any perennial crops: comfrey (*Symphytum* spp.), kale / leaf cabbage (*Brassica oleracea*), and oilseed rape / rapeseed (*Brassica napus* subsp. *napus*).

1.2. Cool season grasses “start growing early in the spring and produce most of their growth in May and June, while some of them will continue to provide good forage through the summer and fall if nitrogen fertilizer is applied in June and August” and all into two categories: bunch forming grasses and sod forming grasses: Bunch forming grasses establish faster, recover from grazing more quickly, and include the following: Annual ryegrass / Italian (annual) rye-grass (*Lolium multiflorum*) establishes rapidly, grows and yields “into late July / early August, is lower yielding than many other grasses, is used as a cover crop in mixtures with other longer-lived grasses,” is used to overseed damaged areas, produces a high-quality forage, and tends to die out over winter; Cock's-foot grass, cocksfoot grass, orchard grass (*Dactylis* spp.) establishes quickly, has moderate winterhardiness, “is an excellent grass for hay / pasture or hay,” is avoided by sheep when too mature, is ready to graze early in the spring, may die out once in a great while, “produces more forage in the late summer / early fall than any other cool season grass,” and recovers quickly from grazing; Common cat's-tail, meadow cat's-tail, timothy, timothy-grass (*Phleum pratense*) establishes moderately easily, is an old standby, is best adapted to cool, wet soils, is low yielding, “is very palatable (sheep prefer it to most other grasses), it heads out most of the summer, unlike all other grasses, tends to be short-lived (it lasts only 3-5 years in most stands)”; English ryegrass, perennial ryegrass, winter ryegrass (*Lolium perenne*) establishes rapidly, grows “in early spring and late early fall, is lower yielding than many other grasses,” is used in hay / pasture fields, may die out over winter, and produces a high-quality forage; Tall fescue (*Lolium arundinaceum*) establishes easily, is “slightly less adapted to drought and flooding extremes than reed canary grass, is the most traffic and shade tolerant of the mentioned grasses,” is very common in pastures, but is very unpalatable; Sod forming grasses form a solid mat, spread vegetatively by underground shoots, “suffer less damage when grazed in wet conditions” and include the following: Common meadow-grass, Kentucky bluegrass, smooth meadow-grass (*Poa pratensis*) establishes easier than other grasses, “is commonly used in many sheep pastures,” is drought and flood tolerant, is more traffic tolerant than most grasses, “is the lowest yielding grass species commonly used in pastures,” is very palatable, is very tolerant of overgrazing (which “can lead to a shift in the composition of grassland species with high nutritional value species becoming less predominant while less palatable plants increase in number” [25], and produces a high-quality forage; Gardener's-garters, reed

canary grass, ribbon grass (*Phalaris arundinacea*) establishes slowly (it takes a year or more to get a stand), “grows up to 150 cm tall if not mowed or grazed,” is extremely winter hardy, is frequently sown in low areas, and tolerates drought and flooding; Smooth brome grass (*Bromus inermis*) establishes slowly, is among the most common species in unimproved pastures, “is more adapted to drought and higher temperatures than other cool season grasses,” is one of the most winter hardy grass species, recovers slowly “after mowing or grazing, which is fine for hay but not for grazing, works well for fields harvested for hay in June and grazed the remainder of the growing season, and yields during May and June with little regrowth the rest of the year.”

1.3. Forbs / phorbs [21] are dicots without woody stems; are herbaceous flowering plants that are not graminoids; have broad leaves; provide a nice variety for sheep; tend to be some of the first plants sheep consume in the pasture due to the high moisture and nutrient content of their flowers, leaves, and tips; include broadleaf plantain, greater plantain, waybread, white man's footprint (*Plantago major*), common chicory (*Cichorium intybus*), and corn sow thistle, dindle, field milk thistle, field sow thistle, gutweed, perennial sow-thistle, swine thistle, tree sow thistle (*Sonchus arvensis*).

1.4. Legumes include the following: Alfalfa / lucerne (*Medicago sativa*) “can be dual used for hay in the spring and grazing thereafter, does not do well in poorly drained soils,” is a good grazing crop, “is primarily a hay and silage crop because it grows very erect,” is the highest yielding legume, “is the most common legume in the dairy regions,” “is too rich for most sheep unless mixed with about 50% grass,” persists for 4-6 years, and “requires a soil pH of 6.8 or higher”; Alsike clover (*Trifolium hybridum*) establishes easily, “is frequently mixed with ladino clover for use in wet soils,” lasts 2-3 years; Birdsfoot deervetch, birdsfoot trefoil, common bird's-foot trefoil, eggs and bacon (*Lotus corniculatus*) is a long-lived legume, “maintains its quality longer than most other legumes” (which makes it good for stockpiling, produces high yields, reseeds naturally, and tolerates wet conditions; Caucasian clover, kura clover (*Trifolium ambiguum*) establishes very slowly (it takes up to two years to establish), “is a rhizomatous legume (spread by underground runners),” is not currently recommended for sheep pasture, produces high and persistent yields; Ladino clover, white clover (*Trifolium repens*) establishes easily (even by frost seeding), is short lived, is the most common clover in pastures, “is the most drought tolerant,” “is the most tolerant of over grazing,” is the tallest growing type, spreads by above ground runners called “stolons”; Red clover (*Trifolium pratense*) establishes easily and quickly (even by frost seeding), is one of the most common pasture legume species, is the highest yielding of the clovers, lasts between 2 (cheap varieties) and 4 (more expensive varieties) years, produces high yields.

1.5. Warm season grasses “are not recommended for sheep pasture in cool areas,” are used for ground cover and wildlife, require high temperatures to grow, “should not be mixed with cool season grasses in pastures because the latter will predominate in cool areas,” and include most prairie species: big bluestem, bluejoint, tall bluestem, turkeyfoot (*Andropogon gerardii*), golden feather grass, (yellow) Indiangrass (*Sorghastrum nutans*), beard grass, little bluestem (*Schizachyrium scoparium*), and switchgrass (*Panicum virgatum*).

2. Mixtures of Pasture and Hay Forage Crops for Sheep

New pastures need to be seeded with a mixture of grasses and legumes for two reasons: to avoid competition among them and to avoid “increase difficulty of grazing

management when species do not mature at the same time.” A good mixture of grasses and legumes for the seeding of pasture and hay forage crops for sheep should include three components: “a long-lived grass; a legume; a cover crop or short-lived grass.”

Examples of mixtures are suggested in Table 1 below. Specialists advise “to plant some pastures to one mix and some pastures to another mix because each mix does better under some conditions and at certain times of the year, allowing good growth during a longer period of the season and across a wider range of environmental conditions.” [26]

Table 1.
Mixes of grasses and legumes for sheep

No.	Forage crops	Amount (kg)
1	<i>Kentucky bluegrass</i>	6,75
	<i>Medium white clover</i>	1,80
	<i>Italian ryegrass</i>	0,90
2	<i>Bromegrass</i>	45,00-50,00
	<i>Red clover</i>	1,80-3,60
	<i>Italian ryegrass</i>	0,90
3	<i>Orchard grass</i>	45,00
	<i>Red clover</i>	2,70
	<i>Italian ryegrass</i>	0,90

Source: [26]

CONCLUSIONS

Pasture floral composition in sheep raising continue to be a topic of interest for researchers and is one of the sheep feeding-related topics: biodiversity, floral composition of pastures, grazing systems, pastoral systems, pastoralism and conflict, pasture quality, and transhumance. Sheep farmers need to consider pasture management, with focus on climate, floral composition, soil, terrain, and water supply.

The mixtures of pasture and hay forage crops for sheep need to include alternative/annual forages, cool season grasses, forbs/phorbs, legumes, and warm season grasses in combinations of at least three forage plant species.

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