

**DLG Information Leaflet 357**

# **Problem Weeds in Grassland**

**Description and integrated measures**



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## Problem Weeds in Grassland

### Description and integrated measures

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## **1. Why control undesirable herbs (weeds) in grassland?**

Undesirable herbs (weeds) can reduce the forage cropping value of grassland growth and in the worst case devalue it completely. These plants rarely achieve any significance on intensively managed grassland. However, extensive farming practices implemented for economic or nature conservation reasons give these plants – that often belong to the site-typical vegetation – a chance to develop.

This presents the users of such grassland areas with a problem. They have to harmonise the newly developing vegetation with the needs of the animals that are to use the fodder. Hobby animal keepers in particular – but also professional farmers – have to learn how to handle the vegetation. This leaflet aims to provide guidance and assistance.

## **2. Absolute weeds**

Absolute weeds are plants that are harmful to productive animals and/or the sod, everywhere, in every condition, with all their organs and in any quantity. As far as possible there should be no absolute weeds in the stand. They include space and nutrient robbers, semi-parasites or complete parasites and genuine poisonous plants.

### **2.1 Poisonous plants**

These plants have a sustainable harmful effect on the animal organism. Poisonous plants include for example *meadow buttercup*, *marsh horsetail*, *ragworts*, *meadow saffron* and *bracken*. The toxic ingredients include alkaloids, saponins, essential oils, oxalic acids or bitters. These plants cause various disease symptoms in the animal, as well as fear, nervousness, recumbency etc. and metabolic diseases, from diarrhoea to paralysis. Both the form of conservation and the age of the plants and plant species play a role.

## **2.2 Space and nutrient robbers**

These include species that are admittedly not poisonous, but are avoided by animals because they cause injuries during feeding. Such plants include for example *gorse species*, *thistles*, *hassock* and *meadow cranesbill*. They also include species with rosettes of leaves, which cannot be taken up during cutting or grazing, or plants that take up too much growth space in relation to their feed value, such as for example the *broad-leaved dock*.

## **3. Optional weeds**

These are plants that can become weeds if they are present in large shares, depending on their development stage and condition on feeding. They include species that change their popularity and suitability with the type of use. Examples are *cow parsley*, *acanthus* or *velvet grass*. Furthermore, species of which the use depends on the harvesting and conservation method are considered to be optional weeds.

One example of this is the *dandelion*. Up to a stand share of 25 % it is an excellent feed herb, if it is grazed or ensiled. However, in the case of conservation as hay, high mechanical losses are to be expected, which is why only a roughly 15 % share in the stand can be tolerated.

## **4. Avoiding weed populations and systematically suppressing weeds**

In order to keep the level of weeds on grassland consistently low, systematic action is necessary in crop management, above all in organic farming. That is why prior to implementing actual control measures, the weed control strategy requires a thorough and detailed analysis of the causes. Only then, if at all possible, can management methods be changed: mechanical or chemical control of the problem plants combined with re-seeding of the land to fill the gaps in existing bare areas with site-appropriate valuable grasses and herbs. Consult the information supplied by the State Plant Protection Services for the selection of suitable chemical active ingredients or agents.

## 5. Description of the weeds

### 5.1 Rattle

*Rhinanthus alectorolophus* (Pollich); Fam.: Phyllanthaceae



**Description:** Stalks simple or branched, shaggy haired at the top; stalk leaves oval to egg-lanceolate, sharply serrated, short-haired, opposing. Growth height 20 to 50 cm; annual (summer annual) shaft plant. Flowering time May to July, pollination by insects, reproduction by seed; 50 to 200 seeds per plant; germination in spring, light germinator, only relatively low storage capability for reserve substances. Root depth up to 60 cm; semi-parasite.

**Occurrence and site:** Warm rough pasture and semi-arid lawns in lime areas; elevation up to 1,500 m chart datum; loamy soils rich in nutrients, bases and lime; loam indicator.

**Arable significance:** On extensively used grassland areas. Is frequently found in fresh to moist meadows on nutrient-rich loamy soils, especially in short-grass meadows with little fertilizer and regular late mowing and on pastures that are little cultivated.

**Feed crop significance:** The rattle is slightly poisonous in green condition due to the alkaloid *aucubin* it contains, which chiefly serves as protection against browsing. In dried condition (hay) it is safe. As of a yield share of 3 % (approx. 10 plants per m<sup>2</sup>) it perceptibly impairs the feed yield.

**Special features:** The rattle is a nectar plant for bumblebees. As a semi-parasite, however, it impairs the growth performance of other, better meadow plants, especially grasses. By contrast with full parasites, semi-parasites only withdraw water and nutrient salts from their host plant, but no sugar. This annual plant propagates solely via seed.

### ***Integrated control***

#### **Preventive and mechanical measures:**

- Seed weed, therefore early cutting before seed maturity (end of June) for several years in a row
- Early grazing
- More frequent use and strong fertilizing. This gives the grasses a head start in growth.

#### **Chemical measures:**

- Chemical treatment is effective using all agents licensed against dicotyledonous weeds. However, the associated elimination of all herb-type plants counteracts the goals of funding programmes for extensive grassland management.



## 5.2 Common ragwort

*Senecio jacobaea* (L.); Fam.: Compositae



**Description:** Plant ramified at top, leaf pinnately parted, egg-shaped end lobes, blunt; stalk with angular grooves, growth height 30 to 90 cm; biennial to triennial, summer-green shaft plant. Flowering period June to July, pollination by insects; reproduction by seed; 1,000 to 3,000 seeds per plant; wind dissemination. Germination time spring, light germinator, duration of germination 10 to 30 days; moderate storage capacity for reserve substances. Root depth down to 30 cm (flat rooter); meadow weed.

**Occurrence and site:** Field boundaries, grassy (autobahn) embankments, woodland margins, extensive pastures. Elevation up to 1,500 m chart datum. Clayey loamy soils in humid climate location; alternating drought indicator.

**Arable significance:** The common ragwort is found most frequently in extensively and less intensively managed areas with gaps in the stand (especially horse pastures) at preferably dry to medium-moist locations. However, where there is high seed pressure from the directly adjacent surroundings, common ragwort can also settle on extensively used meadows and intensive pastures. Common ragwort is not found in intensively used hay meadows.

**Feed crop significance:** The common ragwort is very toxic for productive livestock in fresh and conserved condition (silage or hay) because of its *pyrrolizidine alkaloids* (chiefly *jacobin* and *senecionin*). Literature states the following values that lead to irreversible harm: for horses 40 – 80 g common ragwort-FM per kg body weight are stated as a possible fatal dose; for cattle 140 g FM per kg live weight. The lethal dose for horses is therefore reached at about 25 – 50 kg; for cows at around 100 kg ragwort-FM. For sheep the lethal dose is over 2 kg FM per kg body weight; for goats 1.3 – 4 kg. Areas with a high population of common ragwort should only be use for grazing in the short term or preferably not at all. In grazing animals even small quantities add up and in the course of time lead to acute poisoning. **The mowed growth may not be used for feed!**

**Special features:** All ragwort species are toxic, but common ragwort has the strongest toxic effect of all domestic ragwort species. It is therefore important to know the species: confusions are possible, within the ragwort types with camomile types, cress and with rough hawksbeard, and in the flowerless condition with ambrosia and mugwort. In some countries control is regulated by law.

### ***Integrated control***

#### **Preventive and mechanical measures:**

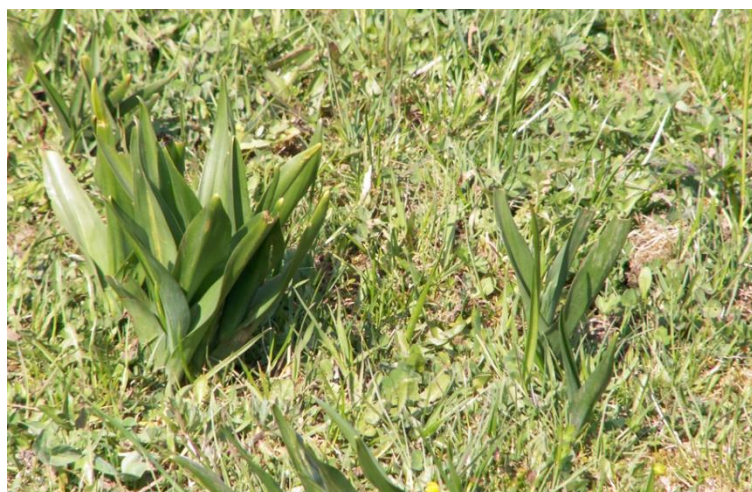
- Avoid gaps
- Avoid trampling damage or over-grazing
- Early mowing before mid-June (prevents seed spreading)
- Cutting out and disposing of individual plants before they flower
- Strong fertilizing, with organic fertilizer too.

#### **Chemical measures:**

- Low to normal sensitivity to MCPA + 2.4-D when the flowers appear in June to July, but mainly only in repeated application because of re-sprouting from the rootstock and formation of germinable fruits right into the autumn. Common ragwort is a primary settler in gaps after the use of herbicide as a result of dispersal by wind and seed stocks.

### 5.3 Meadow saffron

*Colchicum autumnale* (L.); Fam.: Lily family



**Description:** The meadow saffron is without leaves in the flowering period in autumn (special feature). The dark-green, broad-lanceolate, basilar, rather fleshy leaves appear in spring together with the fruit capsule. Growth height 20 to 50 cm; flowering period August to October, reproduction by seed but also vegetative; 150 to 300 seeds per plant; cold germinators with duration of germination over 200 days; high storage capacity for reserve substances, root depth up to 60 cm.

**Occurrence and site:** Moist meadows, river-meadow forests; elevation up to 1,400 m chart datum; deep-grounded, humous loamy and clay soils; alternating damp indicator.

**Arable significance:** The meadow saffron is found chiefly on extensively or late-used or fallow grassland. However, because of its sensitivity to mowing and trampling the plant

is only found on grassland with at most 2 – 3 grazing/cutting operations. As it is left standing by cattle and horses, it occurs more frequently on extensive pastures. Meadow saffron is not found on partly-used or even strip-grazed pastures. In today's grassland the plant occurs above all in nature conservation areas and extensively farmed grassland, as the late cut specified here (after 15 June) is very conducive to the plant. In such meadows it flowers after the second cut in the autumn and fruits even before the first in spring.

**Feed crop significance:** The meadow saffron is considered to be the most dangerous poisonous plant in grassland. Its toxin (*colchicine*) is present in all parts of the plant, but above all in the bulbs and in the seed. Inexperienced grazing animals are occasionally poisoned. As of 2 plants/m<sup>2</sup> it must be controlled.

**Special features:** Colchicine is not degraded by conservation (hay or silage) either, but retains its effectiveness even after several years. Just 5 grams of seed (corresponding to about 20 mg Colchicine) contain the deathly dose for humans. Lethal dose for cattle: 1.2 – 1.5 kg/animal of fresh leaf and capsule material. Lethal dose for horses: 1.2 – 3.0 kg/animal of fresh leaf and capsule material.

### ***Integrated control***

#### **Preventive and mechanical measures:**

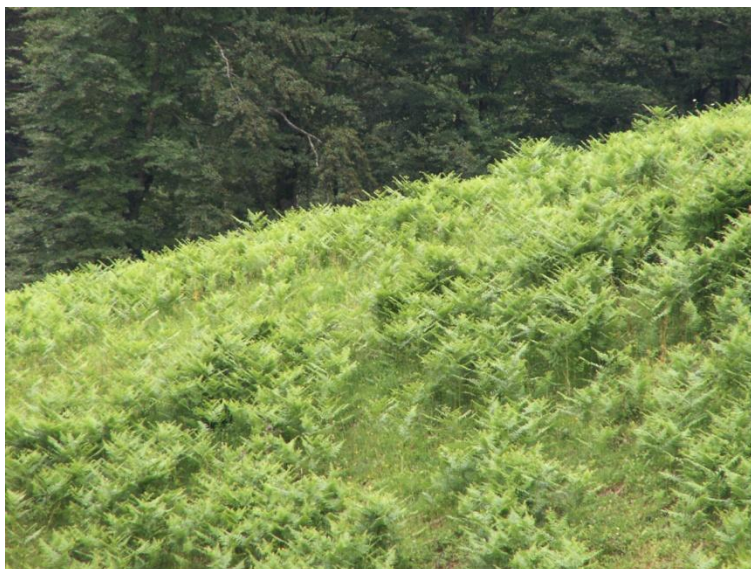
- Continued early mowing for several years or early mulching at the beginning of May (at a meadow saffron growth height of 10 cm)
- Rotational grazing early May with high population density and subsequent post-mowing
- Cutting out or pulling out of the plants in early May (for 2 – 3 years)
- Targeted fertilizing promotes the grasses in the stand.

#### **Chemical measures:**

- Chemical treatment with special herbicides is effective. In some German States non-selective chemical control counteracts the goals of extensivisation programmes, however.

## 5.4 Bracken

*Pteridium aquilinum* (Kuhn); Fam.: Polypodiales



**Description:** Large frond, bipinnate to tripinnate, sitting at the end of long yellowish leaf stalks; leaf blade triangular in outline, top side of the small leaves smooth; stems thicker at the bottom and black-brown. Growth height 50 to 300 cm; summer-green root creepers with long underground rhizomes. Spore maturity July to October, vegetative spreading, but also by spores (wind). High storage capacity for reserve substances. Root depth up to 60 cm.

**Occurrence and site:** Species-low oak and pine woods. Mass spreads can form on lime-free or delimed soils (silicate soils on primary rock). Plant is not a clear character species anywhere. Elevation up to 1,400 m chart datum. Sour, loamy-sandy soils; indicates alternating moist soil conditions.

**Arable significance:** Grows on rough, neglected pastures. This deep-rooted pasture weed is promoted strongly by selective grazing (especially by sheep) and can suppress all other plants when it occurs en masse.

**Feed crop significance:** All plant parts of the bracken are toxic. It contains the saponin *pteridine*, the enzyme *thiaminase* and *cyanogenic glycosides*. These substances cause

avitaminoses in the animals and are eliminated for instance with the milk, making it bitter. It must be controlled as of a 5 % share in the stand, or 3 shoots / m<sup>2</sup>.

**Special features:** Bracken has an extensive root system, making control by grazing difficult. Ferns have a different reproduction strategy to flowering plants. The actual fern plant does not form any blossoms and seeds, but instead spores. These are released from the sporangia, that can generally be seen on the underside of the leaves as brown containers and are dispersed by wind.

### ***Integrated control***

#### **Preventive and mechanical measures:**

- Mowing twice a year with clearing when fern fronds are 30 – 50 cm high, in June and September
- High pasture pressure in early spring in order to damage solumifers (root rhizomes)
- In the case of pasture use it is advisable to graze cattle. Sheep are unsuitable (they select too strongly and cause hardly any trampling damage through their weight)
- Carrying out supporting measures such as fertilizing and lime application on sour soils.

#### **Chemical measures:**

- Results of chemical control measures have been unsatisfactory to date as bracken is very obstinate, even in the event of repeated application of herbicides, and recovers in a few years. When combating individual plants the best effect is obtained with glyphosate agents.

### 5.5 Broad-leaved dock

*Rumex obtusifolius* (L.); Fam.: Polygonales



**Description:** Longish egg-shaped leaf with heart-shaped base, 10 to 30 cm long. Growth height 50 to 120 cm; green, overwinters as a rosette. Flowering period July to August, self-pollinating and cross-pollinating. Reproduction chiefly by seed, but also vegetative. Germination in summer, light germinator; high storage capacity for reserve substances. Root depth more than 100 cm (deep-rooting).

**Occurrence and site:** In heavily fertilized (with farmyard manure, NPK or N) hay meadows and permanent pastures, less in grass-rich dense hay meadows; on waste

dumps and in ditches. In valley and mountain areas up to about 1,600 m above chart datum. Nitrogen indicator.

**Arable significance:** A very troublesome weed on meadows and frequently cut grassland and difficult to control permanently.

**Feed crop significance:** Broad-leaved dock is a low value to valueless, highly competitive space robber, reducing the yield performance of grassland stands. For this reason, and because of its high seeding potential, even single plants are worth controlling. In addition yield performance of the stands is reduced. Livestock only feed on the plants when young and otherwise avoid them due to their high oxalate content.

**Special features:** A single broad-leaved dock plant produces up to 10,000 seeds per plant which remain capable of germinating in the ground for decades (> 60 years). They retain viability in the stomachs of livestock and are transported back on to the grassland via manure and slurry. The seeds can be killed off during digestion of slurry in biogas plants or via composting in manure if temperatures of more than 50 °C are reached.

### ***Integrated control***

#### **Preventive and mechanical measures:**

- Avoid bare patches
- Never allow to flower or fruit
- Avoid excessive nitrogen fertilizing
- Manual weeding, with a special dock weeding implement amongst other things
- Grazing with subsequent mowing and clearing (premature ripening of the inflorescences possible!)
- Early grazing with sheep or continuous grazing with cattle.



**Chemical measures:**

- Controlling single plants: Painting stick or backpack sprayer, with either a total or selective herbicide.
- Treatment of larger areas: Use of a selective herbicide is recommended for a dock population of more than 2 – 3 plants/square metre. Only strong rosettes should be treated before appearance of the curly flower heads (assimilate transport toward the roots). This limits use to April, May (perhaps June) and the middle of August to the beginning of October (for best effect). Autumn is the most favourable treatment time. Spring treatment is only an option where autumn treatment does not fit in the farm operating cycle. Summer treatments can cause damage to grasses during hot spells of over 25 °C. Differing withholding periods for the products should be observed.

## 5.6 Creeping thistle

*Cirsium arvense* (Scop.); Fam.: Compositae



**Description:** Stems not thorny, winged; leaves emarginately denticulate or pinnate, often curly, shiny, thorny-edged, not down the stems. Height 50 to 150 cm; deciduous, shade-loving plant with long underground runners. Flowering July to August, pollination by insects. Vegetative reproduction, but also by seed (dispersed by wind). Germination in spring, high storage capacity for reserve substances. root depth more than 100 cm (deep rooting). Thistles are important sources of nectar for widely differing flower visitors - so control should be carried out with a sense of proportion.

**Occurrence and site:** Weed populations on fields, fallow arable land, waste dumps, in copses and at livestock resting sites. Nutrient-rich, deep, sandy-stony loamy soils; loam indicator; nitrogen indicator.

**Arable significance:** Undesirable weed on cereal crop and root crop fields and on over-fertilized and neglected continuous as well as rotational pastures with few paddocks and insufficient livestock density.

**Feed crop significance:** Creeping thistle is a space and nutrient robber. It has no value and is avoided as a feed plant due to its around 5 mm long, sharp thorns.

**Special features:** Forms up to 5,000 airborne seeds per plant! Stolons can grow by 1 to 2 metres per year. The roots of undisturbed thistles have the same energy density as sugar beet. Thistles will always send up new growth from root fragments!

### ***Integrated control***

#### **Preventive and mechanical measures:**

- Avoid bare patches
- Increased cutting frequency
- Earlier cutting
- Repeat mowing in June
- Intensive grazing with subsequent mowing, before flowering begins (beginning of July)
- Rolling in spring, although damage to the growing grass structure is possible.

#### **Chemical measures:**

- The plants are susceptible to special active substances during rapid growth and at around 20 – 30 cm height before the formation of inflorescences. For this reason it is more effective to weaken the plants initially by mowing in spring and only then treat the new sprouting growth. The results of chemical control measures are not lasting. Signs of success can generally only be seen after several years.

### 5.7 Marsh horsetail

*Equisetum palustre* (L.); Fam.: calamitaceae



**Description:** Flowerless, perennial cryptogams with above-ground leaf shoots (fronds), which consist of single, millimetre-long interlocking shoot segments. Horizontally attached lateral branches are very similar to the stem of the shoot but develop later. Sporangia develop in terminal spikes on the shoot growth. Fertile and sterile shoots have the same form, light olive-green and 1 to 3 mm thick, stems unbranched and 5-furrowed, always in rings around the vertical leading shoot. The above-ground part of the plant reaches a height of around 20 – 50 – 70 cm (May to the end of July). Spore formation from June to September. Subterranean earth shoots (with reserve buds and roots) make a horizontal creeping rhizome system and are responsible for perennation and very effective vegetative propagation of the species. Propagation by spores possible, but less significant.

**Occurrence and site:** In damp grass land on mineral and fen soils, spreading from ditches and banks, not on pure upland moor and not on the tidal area of coastal marsh (salt content is the determining factor).

**Arable significance:** causes significant crowding in the case of intensive farming practices, precluding further farming use. Possibilities for direct control are very limited and only temporarily effective.

**Feed crop significance:** Not suitable for ruminants, as avoided. Detrimental effect on health and performance is considerable due to varying alkaloid content (palustrine amongst others), saponins and polyphenols. Horses eat these plants on the meadow and in hay, but long-term ingestion is also dangerous for them as enzyme activity (thiaminase) leads to vitamin B<sub>1</sub> deficiency.

**Special features:** Confusion possible between the marsh horsetail and the field horsetail. The entire marsh horsetail plant is highly poisonous and causes avitaminosis. Toxicity also remains present in hay and (probably) in silage. In dairy cattle, intake of marsh horsetail leads to a reduction in milk yield, bitter-tasting milk, black diarrhoea, paralysis, apathy.

### ***Integrated control***

#### **Preventive and mechanical measures:**

- Improvement of water drainage (amelioration)
- More intensive cultivation (fertilization, land use)
- Rolling of developed shoots with profile rollers
- Intensive grazing (high livestock density with animals experienced in meadow grazing), subsequent mowing and sod maintenance
- Intermediate cropping use and new grass seeding
- Cutting the horsetail shoots below ground at a depth of around 30 cm (with special duckfoot shares). The shoot fragments left above ground die off quickly or their development stops completely. New sprouting growth only takes place after several months.

#### **Chemical measures:**

- Growth-hormone-like substances (MCPA; 2,4 D) can be sprayed to kill the fronds. This must be repeated before each cutting as horsetails have insufficient nutrient transport to the deep-reaching rhizome network.

## 6. References

- Bosshard A., Joshi J., Lüscher A., Schaffner U. (2003): Jakobs- und andere Kreuzkraut-Arten: eine Standortbestimmung – Agrarforschung / Bundesamt für Landwirtschaft 10, Schweiz Bern, 231 – 235
- Briemle, G. (1996): Farbatlas Kräuter und Gräser in Feld und Wald – Verlag Eugen Ulmer, Stuttgart
- Briemle, G.; Rück K. (2006): Ampferbekämpfung durch Schafbeweidung – Ergebnisse aus einem 5jährigen Freilandversuch – landinfo 3/2006
- Elsässer, M. (2002): Stumpfbblätteriger Ampfer Biologie, Vermeidung, Bekämpfung – Merkblätter für die Umweltgerechte Landbewirtschaftung No. 22
- Köhler, I. (1971): Verbreitung, Biologie und Bekämpfung des Sumpfschachtelhalmes – in: Aktuelle Fragen des Landbaues, publications series of the Chamber of Agriculture Weser-Ems, issue 6; Paul Parey in Berlin and Hamburg.
- Neumann, et. al; Umgang mit dem Jakobskreuzkraut Meiden – Dulden – Bekämpfen; DVL and LLUR, 2009
- Siegrist-Maag S., Suter M., Lüscher A. (2005): Bewirtschaftung and Jakobs-Kreuzkraut ein Zusammenhang, Agrarforschung / Bundesamt für Landwirtschaft 12, Schweiz Bern, 398 – 403
- Stählin, Maßnahmen zur Bekämpfung von Grünlandunkräutern in Das Wirtschaftseigene Futter 15 pages 249 – 334, 1969
- [www.gruenland-online.de](http://www.gruenland-online.de)
- [www.vetpharm.uzh.ch](http://www.vetpharm.uzh.ch)

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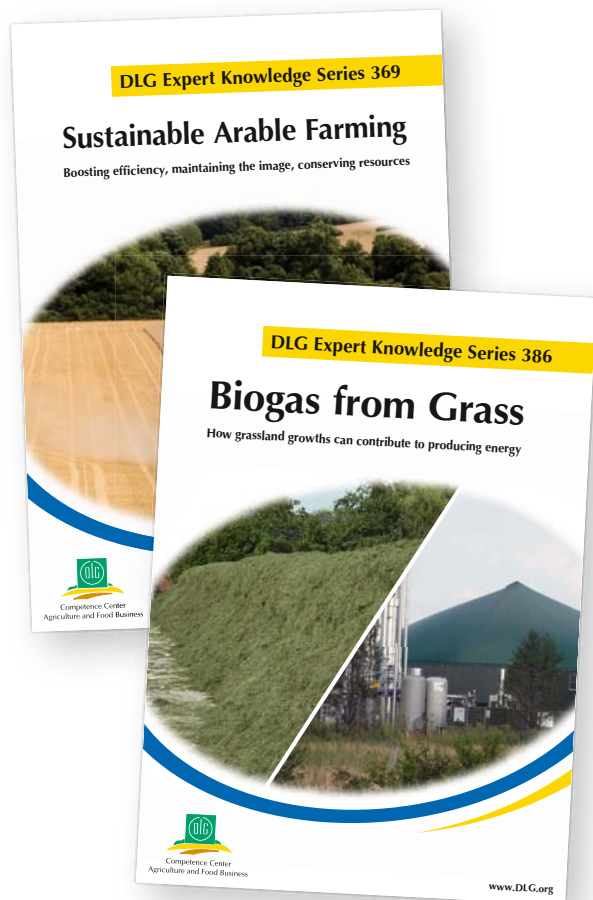
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