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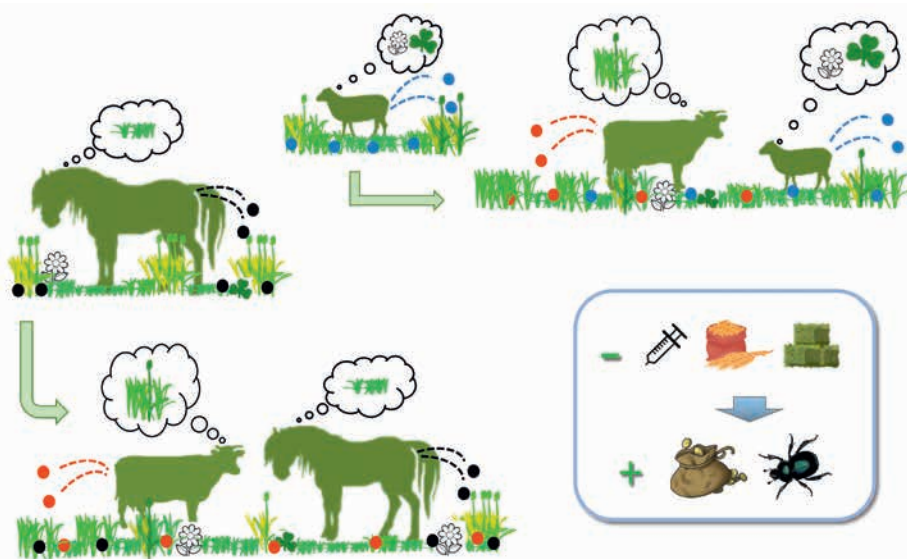
Livestock co-grazing

A catalyst for the agroecological transition of grassland systems

Agroecology, as applied to livestock production, is based on the principle that animal-resource diversity within livestock farming systems can reduce farmer reliance on inputs (drugs and concentrates). In grassland-based systems, mixed grazing is assumed to make more efficient use of pastures because of the complementary of cattle, sheep and horse grazing behaviour. Grazing cattle—and even more so horses—create short vegetation patches in pastures, and thereby act as a facilitator for the other species, which will benefit from the subsequent high quality vegetation regrowth. Mixed grazing is also assumed to have

a dilution effect on the livestock parasite load due to the host specificity of most digestive-tract strongyles—during the phase of the cycle when infesting larvae are in the sward, these parasites may be ingested by an animal from the other species, thereby interrupting the larval development cycle. More efficient use of grass resources was pointed out as being among the main advantages of mixed grazing by 84% of cattle-sheep farmers surveyed in Auvergne (France) during the new-DEAL project. A bioeconomic optimization model also predicted a 30% reduction in feed concentrate use. In beef cattle-saddle horse farms, we observed

a 15% increase in stocking density, a clear reduction in feed purchases and in rotary slasher use than in specialized equine farms. Parasite excretion by ewe lambs grazing with heifers was twofold lower compared to monospecific grazing, and their growth was 40 g/day higher. Parasite excretion by young horses grazed with cattle was also twofold lower. A reduction in the frequency of anthelmintic treatments would reduce variable farm costs and benefit coprophagous insects. Our recent research aims to determine pasture management methods (species ratios, etc.) that would optimize the benefits of mixed grazing.



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Ecological intensification in aquaculture

Aquaculture is the agricultural production sector with the highest growth rate. In 2030, it will have to provide more than 60% of all fish needed for human consumption. This increased production will induce greater input consumption. The resulting environmental impacts and the degradation of farm effluents highlight the need to design new aquaculture production systems. In this context, the ecological intensification of aquaculture systems proposes the use of the ecological processes and functions of the system as a way to boost production, reduce impacts, and enhance the ecosystem services of aquaculture. The challenge is to foster systems requiring few or no inputs,

such as formulated feeds, while maximizing the outputs by relying on natural productivity and the development of associated ecosystem services.

Aquaculture practices for ecological intensification are highly diversified and often integrated within the ecosystem or territory. In Brazil, an ecological intensification scenario that included lagooning with macrophytes in integrated systems called MAPIVI (pigs/tilapia or carp polyculture) was studied. **Effluent quality was improved alongside greater acceptability of the system. This validated scenario was thus incorporated in the national framework for fish farming in the Brazilian**

state of Santa Catarina. In Indonesia, a combined *Pangasius*/gourami/duckweed system was tested in ponds. **This scenario—based on nutrient recycling, water quality management, and diversification of produced species—performed better in terms of eutrophication and acidification, as calculated by life cycle analysis.** Nevertheless, adapting scientific knowledge to the diverse range of aquaculture operations and creating a sociocultural environment conducive to innovation appropriation remain the key challenges of ecological intensification in aquaculture.

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◀ **Agro-aquaculture ecosystem in West Java, Indonesia.**
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