

List of Proposed Master's Thesis Topics

Sustainable Production Systems (SPS) in Agriculture and Forestry	
Topics and further information	Contact and Geography
Crop production - Switzerland	
<p>Climate change mitigation through sustainable soil organic matter management in permanent grassland</p> <p>The amount of fixed carbon in the soils is an important factor for the mitigation the greenhouse effect. Humus balances are useful tools to estimate the effect of site factors and management on soil organic matter content. These models allow to make statements about the C-sequestration potential and the long-term maintenance of soil fertility. For arable crops, such humus balances are well established (still the absolute balance depends on the used model). However, this only refers to about 25% of agricultural area (LN) in Switzerland. On about 70% of LN - the permanent grassland - these models are not applicable! For the sake of simplicity, it was assumed that the soil organic matter supply was positive, mostly linked to the biomass production; accordingly, the topic was neglected in research and agricultural extension. In this work, the relationship between site factors, management and soil organic matter content in permanent grassland shall be investigated empirically.</p>	<p>Stéphane Burgos, Christian Thalmann Switzerland</p>
<p>Soil mapping of grassland in mountain areas</p> <p>The productivity of grass production is linked to the water availability in the soil and the precipitations. Very few information is available on soils in Switzerland at a detail scale (>1:5000) in general but particularly in mountain areas. The project is to develop soil mapping methods adapted to the heterogeneity of this kind of soils and to evaluate their production potential in relation to the lithology of a given region. The most important factors are the available water and the organic C content. Correlation between grass yield and soil properties need to be done. The plots will be chosen in BE, VD or Jura cantons.</p>	<p>Stéphane Burgos Switzerland (BE, VD, Jura)</p>
<p>Promoting biodiversity in extensively managed meadows with unmown stripes</p> <p>In extensively managed meadows, farmers can leave unmown strips to promote small animals and insects, which use this areas as refuges. It is recommended to leave 10% of the cut surface as old grass and it is advised to change the location with each cut to avoid bush encroachment. The question is, if changing or leaving the location of uncut stripes influences the plant community of the meadows? The results of this work can be used to give recommendations on the management of uncut grass stripes.</p>	<p>Silvia Zingg Switzerland</p>
<p>Bearbeitbarkeit mit verschiedenen Bodenbearbeitungsgeräten als Funktion des Bodenwassergehaltes</p> <p>Im Rahmen eines ESA-Projektes ist das Ziel die Befahrbarkeit von Böden (Verhinderung von Bodenverdichtung) und die Bearbeitbarkeit der Böden (kann der Boden bearbeitet werden oder ist es zu nass oder zu trocken?) teilflächenspezifisch zu schätzen. Diese Informationen dienen der Landwirtin/dem Landwirt für eine optimale Bewirtschaftung der Felder.</p>	<p>Matthias Stettler, Bernhard Streit Switzerland</p>

<p>Im Rahmen dieses Projektes soll die Datengrundlage für die Bodenbearbeitbarkeit verbessert werden, und Methoden zur Abschätzung des optimalen Zeitpunktes (optimalen Bodenwassergehaltes) für die Bearbeitung validiert und bei Bedarf verbessert werden. Insbesondere in Bezug auf verschiedene Bodenbearbeitungsgeräte ist der Wissensstand ungenügend. In dieser Studie sollen deshalb Feldversuche mit verschiedenen Bodenbearbeitungsgeräten bei verschiedenen Bodenfeuchten und auf verschiedenen Böden durchgeführt werden.</p>	
<p>Landscape ecology of the spotted wing drosophila (<i>Drosophila suzukii</i>) and its natural enemies The newly invasive spotted wing drosophila, <i>Drosophila suzukii</i> is a polyphagous pest causing major revenue loss in Swiss berry, stonefruit and grapevine production. Risks to crops depend strongly on the structure of the surrounding landscape. Semi-natural habitats such as hedgerows, forest borders and extensively managed high-stem fruit trees provide the pest with alternative food resources and protection from unsuitable weather. They may serve as reservoirs, promoting early-season population growth and the colonization of neighbouring crops. Yet unmanaged habitats bordering the crops also provide a habitat for biological control agents such as predators and parasitoids. The project uses cherry trees that were experimentally planted along a landscape gradient differing in the proportion of woody habitats in the surroundings and the distance from the closest, unmanaged habitat. The timing and the extent of tree colonisation by <i>D. suzukii</i> will be assessed and the abundance, diversity and performance of prevalent natural enemies recorded. Results will improve understanding of the ecological requirements of <i>D. suzukii</i> and its natural enemies and may be used to develop landscape management plans aiming to reduce infestation pressure on cultivated fruit crops.</p>	<p>Lindsey Norgrove Switzerland (Bern, Fribourg, Solothurn)</p>
<p>Evaluation of known and new cover crops and intermediate crops for energetic and industrial use One aim of the cultivation of cover crops and intermediate crops is to produce biomass for the improvement of soil quality. Part of this biomass could be used as a starting material for biofermentative processes for energy and industrial production (e. g. production of ethanol, higher quality acids, biofuels, methane). In the context of small parcel field trials, known and new plants are to be cultivated and harvested. On the basis of these data, calculations on the suitability for energy production and the humus balance are to be carried out. If interested, further laboratory analyses are possible.</p>	<p>Bernhard Streit Switzerland</p>
<p>How much can non-chemical weed control cost in Switzerland? How much can non-chemical weed control in arable crops and vegetable crops cost to be economically advantageous over chemical weed control? Within the framework of a comparison (procedural costs, industrial management, overall operational situation) scenarios are to be calculated in order to estimate future market prices of equipment and the practical benefits.</p>	<p>Martin Bauer, Bernhard Streit Switzerland (BE)</p>

<p>Linked production of high-protein and energy feed out of native biomass</p> <p>The self-sufficiency of high-protein feed in Switzerland amounts to only 20%. The remaining 80% come mainly from imported soy meal which has a bad ecological footprint because of its mostly unsustainable cultivation practice. An increasing native production of protein feed is therefore of central concern for Swiss agriculture. One possibility is the extraction of proteins out of plant biomass to be used as high-protein feed, independent of the fodder value of the entire plant. Having the objective of maximum added value and of utilizing the plant biomass as completely as possible, the residual materials will be transformed into chemicals such as lactic acid or energy carriers such as biogas. As possible protein sources, both economic unexploited but available biomass (catch crops, natural meadows, ecological compensation areas) as well as plants used specifically for linked usage such as the fodder legume alfalfa or the energy plant <i>Sida hermaphrodita</i> will be considered. Latter possible source seems to be very promising considering its similar protein content as alfalfa (Borkowska, Molas 2012) and its high yield in biomass (25 t DM/(ha a) (Jablonowski et al. 2016).</p>	<p>Judith Peter-Egli Switzerland</p>
<p>Mountain vs. Valley: Growth form of redclover ecotypes from different origins.</p> <p>Red clover ecotypes from higher altitudes differ strongly in their growth (length and vertical orientation of tillers) as compared to ecotypes or bred varieties of the same species from the lowlands. The goal of the thesis will be to describe and quantify these growth differences based on field/growth chamber experiments in order to elucidate, whether the differences in growth are related to environmental (i.e. higher radiation at higher altitudes) and/or genetical differences due to adaptation.</p>	<p>Beat Reidy Switzerland</p>
<p>Stickstoff-Flüsse in zwei Milchviehweidesystemen</p> <p>Im Projekt NiceGras in Posieux werden für zwei Weidesysteme (1. Vollweide ohne Ausgleich des Proteinüberschusses; 2. Vollweide mit Ausgleich des Proteinüberschusses durch Beifütterung von Maissilage) alle N-Flüsse in Fütterung, Ausscheidungen der Tiere und Emissionen in Luft und Gewässer erfasst. In dieser Masterarbeit geht es nun darum, den N-Haushalt gesamtheitlich zu interpretieren und daraus Optionen zur Verbesserung der N-Effizienz sowie zur Minimierung der Umweltbelastung abzuleiten. Kann kombiniert werden mit einer Teilzeitanstellung als Praktikant/in während der Vegetationsperiode zur Unterstützung der Versuchstätigkeit (Verzehrsschätzung, Probenahme, Tierbeobachtung etc.).</p>	<p>Thomas Kupper, Beat Reidy</p>
<p>Does reduced summer rain change vegetation composition in dry meadows via effects on seedling establishment?</p> <p>As changes of the global hydrological cycle are pushing precipitation to extremes, reduced water availability in soils causes longer and more severe intermittent drought stress with the potential to widely modify ecosystem structure and function. In a dry meadow at Thun (site listed as a TWW of Swiss national importance) we have established a study site using rainout shelters in collaboration with an internationally coordinated drought experiment (IDE) to reduce annual rainfall to a centennial annual minimum. At this site we offer study plots in two habitat types characterized by <i>Brachypodium</i> or <i>Festuca</i> for a seed-</p>	<p>Andreas Stampfli Switzerland (Thun)</p>

<p>addition experiment to a master student. In collaboration with the grassland ecology team at HAFL and international partners of IDE, this master thesis will identify an innovative research question and perform a seed-addition experiment in the field over a period of 9-12 months Internationally coordinated drought experiment: http://drought-net.colostate.edu/</p>	
<p>Improvement of the seed yield in Italian ray grass Italian ray grass is an important component for Swiss grassland mixtures. For the economic success of a ray grass breed agronomic performances (yield of biomass, digestibility, resistance traits) and also seed productivity (seed yield) are playing a crucial role. So far, seed yield hasn't been under the main criteria in ray grass breeding at Agroscope, Switzerland.</p> <ul style="list-style-type: none"> • Preparation of a research plan for the thesis • Preparation and maintenance of greenhouse trials, including artificial inoculation of maize residues and application of mulch • DNA extraction and quantitative PCR of fungal material • Preparation of in vitro trials, including inoculation with mycelium/conidia and exposure to volatiles • Microscopy tools • Statistical analysis and interpretation of results • Writing of the MSc thesis <p>The aim of the study is to find out if, and to what extend Swiss ray grass breeds have disadvantages regarding seed yield compared to market available international breeds. Further, the reasons for this limited performance of Swiss ray grass breeds in the field of seed production should be uncovered. The acquired knowledge is to be used to propose new strategies to Agroscope focusing on better seed productivity in breeding programs.</p>	<p>Andreas Keiser Switzerland</p>
<p>Resource conservation by intercropping and undersowing More efficient use of light, water, nutrients and energy is a great challenge for the future. Intercropping and undersowing are possible solutions in arable farming and should be studied in depth. In several European countries, more research is done in this area.</p>	<p>Hans Ramseier Switzerland</p>
<p>Irrigation in Switzerland - any clue? Little is known about the extent of irrigation and irrigation practices in Switzerland. A first assessment by the Swiss Federal Office for Agriculture (FOAG) in 2006 has yielded unsatisfactory results, and clearly indicated the need for more systematic and comprehensive data acquisition regarding irrigation. This project aims at developing and testing an approach to assess irrigated areas and crops, irrigation systems, water sources and abstraction methods, and water quantities used for irrigation on a regular and systematic basis.</p>	<p>Christoph Studer Switzerland</p>

Topics and further information	Contact and Geography
Crop production - International	
<p>Development of a sustainable rural agriculture in western cameroon to prevent migration into cities</p> <p>The NGO Shya Lou (CH) in collaboration with the local association “Ceiba Bandrefam” started a project to help support the development of sustainable agriculture in a rural region in western Cameroon (French speaking region) with the aim of preventing rural migration to the cities. The self-sufficiency through sustainable production systems with the “motto” help for self-reliance is the aim of the project. Crop and production animal production for self-supply as well as processing and storage of locally produced foodstuffs is a main focus. The local “Université des Montagnes” in Baganté is interested in a collaboration with the two associations in the project. The association Ceiba Bandrefam will support the student, organizing transport and accommodation and coordination with the main project. The student must be able to speak French!</p> <p>Objectives</p> <p>The master thesis will include an analysis of the present situation on the small farms in this rural region with a focus either on animal production or agricultural crops, drawing conclusions which will help defining measures to improve the situation on these farms or to find out what is missing for a sustainable production and profitable farming systems. The farmers will also receive training through the project. The master thesis could paint a picture of a possible future for young farmers in this rural region or help develop production system with a practical orientation, including important points like husbandry systems, biosecurity (how to prevent epidemics), animal health and welfare in general, feeding (use of available feed crops or by-products) etc.. It could also help create a vision for a possible food chain from the production of feed and production animals to slaughter, processing and storage including food safety and marketing of the products.</p>	<p>Judith Peter-Egli Cameroon</p>
<p>Fertilization and pest control in West and Central Africa</p> <p>In West and Central Africa, smallholder farmers manage a plethora of diverse, albeit low-yielding perennial, annual, cash crops and subsistence agroecosystems, which are predominantly rainfed. The region has the world’s lowest fertilizer application rates (Morris et al. 2007). There is little control over the use of pesticides and economic treatment thresholds for intervening to control diseases on staple crops have not been established. Multiple diseases may be present in smallholder fields, however, the widespread practice of intercropping, the high crop species diversity and variable planting densities mean that pesticide interventions targeting a particular crop may be inappropriate as damage levels may not approach economic treatment threshold and spraying may have undesirable secondary effects.</p> <p>As an example, preliminary unpublished work on plantain has revealed that the underlying cause of high plant losses of plantain in West and Central Africa, previously attributed to root nematode damage, is related to lack of fertilization (Norgrove unpubl.). Combining research results from publications across the region has shown that losses of individual plants can exceed 70% without any fertilizer application, however, with organic or inorganic fertilization up to 200 kg elemental</p>	<p>Lindsey Norgrove</p>

<p>N and K ha⁻¹, losses are reduced to approximately 10%. Even much lower applications of fertilizer can reduce losses by half (Norgrove and Hauser 2014). Such a phenomenon may also apply to other perennial food crops (yam, cassava, sweet potato), particularly those with a flexible planting to harvesting period, but has not been investigated, to date, and the reverse (increased losses with fertilization) might also occur.</p> <p>This project would: Systematically review existing peer-reviewed literature for research where pest and disease losses were assessed under different nutrient addition regimes. Collate those data by crop and conduct a meta-analysis to test the hypothesis that losses and nutrient addition are not independent.</p>	
<p>Cocoa agroforestry management for systems health in Ghana and Côte d'Ivoire</p> <p>Three quarters of the world's cocoa (<i>Theobroma cacao</i> L.) grows in unsustainable monocultures in West Africa that are under pressure from various ecological, economic and social issues, such as too old tree stocks, degraded soils, prevalence of pests and diseases, vulnerability to climate change, low productivity, low farm gate prices and an old farming population. A potentially sustainable alternative is the dynamic agroforestry system. While we know that well-managed DAFS can provide a range of benefits, there is the need to optimize management practices in order to ensure ecological, economic and social resilience. The mere association of shade trees and cocoa, for example, may not be sufficient in order to enhance soil fertility in a sustainable way. Rather, there is a need for high planting densities and frequent management – especially pruning – interventions to maintain a healthy DAFS. However, the high labour- and knowledge-intensity of DAFS may pose a challenge in different socio-economic contexts. When making management choices, farmers have to manage trade-offs between provisioning (i.e., productivity) and other ecosystem services that may not directly contribute to their livelihoods yet maintain the overall health of their production system (“system health”). Understanding and supporting the development of such systems calls for analyses of local know-how, strategies and practices of different stakeholders in the cocoa value chain. Furthermore, the performance of DAFS needs to be assessed holistically, looking at innovation processes, changes in value chains, and the landscape impact of DAFS. Thus, both the most suitable design of DAFS and the best practices for increasing system health may vary depending on local conditions.</p> <p>Objectives of the study:</p> <ul style="list-style-type: none"> • To further develop the existing literature review about DAFS • To conduct a case-study on the health and management of previously installed DAFS plots • To help implementing further field trials • To do a cost-benefit analysis of the previously installed DAFS • To develop an informative leaflet with the main results of the field assignment/thesis 	<p>Ingrid Fromm Ghana, Côte d'Ivoire</p>

<p>Pepper production in Kampot, Cambodia Kampot is famous for the outstanding quality of its pepper. Some even say that it is the best pepper in the world. Mr Markus Lehmann, together with a Cambodian partner Khom Phy, own and run a pepper farm (3ha pepper, farm size 7ha) in Kampot. The production is mostly exported to Switzerland and Europe, and sold through direct (on-line) marketing channels (www.goutduterroir und www.raffinessen.ch). Pepper production in Kampot is facing several problems such as poor water management, damages to the crop by termites, poor crop management resulting in low yields. On the other hand, the location is quite favourable, and the local conditions are rather good and unique and therefore the cultivation of pepper quality is good. That is why this small area in the south of Cambodia received a geographical indication. It is possible to produce four kinds of pepper from the same plant with exceptional quality: green, black, red and white. The pepper production in that region must be organic (because it is in a protected area). All pepper producers are members of a cooperative the role of which is to verify that its members comply with the rules relative to managing the protected area. The proposed MSc thesis may focus on the pepper agronomy, and propose improvements to overcome the mentioned problems, based on literature review, interviews with local pepper producers (including a specialized research centre in Cambodia). Looking into the sustainability of production is also part of the research.</p>	<p>Dominique Guenat Cambodia</p>
<p>Research about the expected impacts after changing the production patterns from monocultures to diversify production. The organization “Aqua Alimentata”, Swiss NGO (from 2012 on) Goal: Increase agricultural productivity with the promotion and installation of irrigation systems as well as agroecological and orchards management trainings The project has 3 main activities:</p> <ul style="list-style-type: none"> • Local production of water pumps: “Swiss-PEP” technology (simple, with local material, low investment, resistant) • Promotion, planning and installation of irrigation systems: with the support of a technic team. The farmers pay the 50% of the installation cost. • Agroecological field trainings in: a) irrigation techniques b) orchards design, plant protection c) soil protection d) native seeds, reproduction and storage. <p>Additional topics:</p> <ul style="list-style-type: none"> • Development of marketing strategies of the project towards the participants • Establishment of a social network for the communication with and between the participants and training all the participants in its use. • Develop informatic tools for collecting and processing all the monitored data • Systematization and analysis of the monitored data • Development of the information material for all the participants • Training of the project team in agroforestry and agroecological topics 	<p>Christoph Studer Guatemala</p>

<p>The agronomic assessment of potential rotation crops for irrigated rice in Northern Senegal</p> <p>Since 2011, the Syngenta Foundation for Sustainable Agriculture works with growers across West Africa with the aim to improve the productivity, profitability and resilience of local rice production and reduce the region’s reliance on food imports. In Senegal, we work with farmers in irrigation schemes in the North of the Country (Senegal River Valley, roughly 100’000 ha of irrigated land), deploying new technologies, production protocols and mechanized equipment to local farmer cooperatives.</p> <p>The continuous mon-cropping (rice-rice rotations) in the production area of the Senegal River Valley has led to the accumulation of a variety of challenges that reduce the overall yield potential of the production system. These challenges include the build-up of a substantial weed and pest pressure and an overall loss of soil fertility and soil organic matter. A potential way to mitigate such adverse effects of mono-cropping would be to introduce rotation and cover crops to break pest cycles, diversify weed management options and introduce organic matter (as well as nutrients) to the soil. Given the overall favourable agroecological conditions in the production area (low disease pressure, high solar radiation and constant availability of irrigation water), we would expect a number of crops to be considered to diversify the cropping systems and increase the resilience and profitability of local farmers.</p> <p>Moreover, the mechanized equipment available through the CEMA platforms could offer additional solutions for field preparation, planting and harvesting new crops.</p>	<p>Nancy Bourgeois Lüthi Senegal</p>
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Topics and further information	Contact and Geography
Animal Science - Switzerland	
<p>Investigation of technical and economic aspects for energy production using horse manure The disposal & recycling of horse manure is a central problem, especially for horse farms without access to arable land. 'Swiss Horse Professionals' – the largest horse association in Switzerland – is seeking for innovative solutions regarding the disposal and treatment of horse manure. However, before concrete solutions can be offered, more knowledge of the composition and energetic output of horse manure is required. This project offers students the opportunity to expand their personal knowledge in the field of alternative energy sources, for example Ethanol. Furthermore, valuable experiences and contacts in collaborating with the association 'Swiss Horse Professionals' can be made.</p>	<p>Michael Studer, Conny Herholz Switzerland</p>
<p>Conservation of local Swiss breeds: evaluation of the cryoconservation scheme To ensure the conservation of local breeds the set-up of an cryoconservation scheme is important. Semen doses of the local cattle and pig breeds are annually collected and stored. However, for local goat, sheep and chicken no or very limited material is stored. The goals of this thesis are a) to evaluate the actual scheme and the stored material, and b) to present ways to collect and store material for the local small ruminant breeds.</p>	<p>Christine Flury Switzerland</p>
<p>Überarbeitung des Neunfelderdiagramms in der Milchviehzucht In der Milchproduktion werden bei allen Zuchtverbänden die Ergebnisse der Milchkontrollen im sogenannten Neunfelderdiagramm dargestellt und zur Beurteilung der Fütterung herangezogen. Erfahrungen zeigen, dass die Aussagen gemäss Diagramm nicht immer mit den Beobachtungen am Tier übereinstimmen. Insbesondere ist ein starrer Eiweissgehalt als Grenzwert zur Beurteilung der Energieversorgung problematisch. Es gibt neue Ansätze aus Deutschland, wie der Nutzen für Milchviehalter durch eine andere Auswertung der Milchinhaltsstoffe erhöht werden könnte. In dieser Arbeit sollen diese Ansätze für Schweizer Rationen untersucht und evaluiert werden.</p>	<p>Stefan Probst</p>
<p>Stratégies pour un meilleur contrôle parasitaire des jeunes bovins En première année de pâture, les jeunes bovins sont soumis à de nombreux parasites présents dans les prairies pâturées. Ces infestations peuvent nuire fortement à la santé et au bien-être des animaux. Les parasites internes sont habituellement contrôlés à l'aide d'anthelminthiques chimiques, produits qui peuvent devenir inefficaces lorsque les parasites développent des résistances et qui posent des problèmes environnementaux. Les jeunes bovins peuvent développer des défenses immunitaires qui les protègent suffisamment dès la deuxième saison de pâture lorsque la pression parasitaire reste modérée. Dans un précédent projet de la Fondation Rurale Interjurassienne (FRI) et de l'Institut de Recherche de l'Agriculture biologique (FiBL), des méthodes de régulation de la pression parasitaire sans intrants chimiques ont été élaborées. Parmi les avancées de ce projet, un outil d'évaluation et de maîtrise de la pression parasitaire a été élaboré pour les troupeaux laitiers.</p>	<p>Danja Wiederkehr Switzerland (Jura)</p>

<p>Ce travail de Master a pour but de valider l'outil d'évaluation dans les élevages laitiers et de l'adapter aux élevages allaitants où les conditions de garde et donc d'exposition du jeune bétail aux parasites sont différentes. Le travail comportera des relevés sur des exploitations agricoles ainsi que des analyses coproscopiques en laboratoire. La personne engagée travaillera en étroite collaboration avec des éleveurs et leurs animaux et bénéficiera d'une formation pour les travaux de laboratoire.</p> <p>Ce travail se déroule dans le cadre d'un projet plus étendu dans lequel, entre autres, la résistance des parasites des bovins aux anthelminthiques sera testée pour la première fois dans l'Arc jurassien.</p>	
<p>Estrogens in husbandry animals and their potential environmental effects</p> <p>The regular detection of hormonally active substances in surface waters worldwide is alarming. A potentially important source of hormonal substances that has received only little attention so far is agriculture. Particularly important is the input of estrogens from livestock farming. Estrogens are natural steroid hormones that govern sexual reproduction and development in vertebrates. Already trace concentrations of these very potent endocrine disrupting chemicals in the environment can lead to negative and sometimes irreversible effects in exposed organisms. To estimate and to control the resulting exposition, it is important to know the prevalence of estrogens and estrogen-like compounds in the environment.</p> <p>Although it is assumed that estrogens from livestock contribute to the total estrogen load in the environment, the development of estrogen concentrations over an animal's lifetime is not fully understood to date. Furthermore, in depth research is needed to quantitatively determine estrogens in urine, blood plasma and faeces of husbandry animals by means of sensitive and specific LC-MS/MS.</p> <p>The Master's thesis aims at focusing on the analytical chemistry of estrogens, the output of estrogens from the endocrine organs of livestock and/or the environmental fate and behaviour of estrogens.</p>	<p>Thomas Kupper Switzerland</p>

Topics and further information	Contact and Geography
Animal Science - International	
<p>Quantifying the environmental footprint of dairy production and the potential for reducing it</p> <p>The global importance of dairy farming has grown for decades. According to FAO statistics, the number of dairy cattle has increased from 0.9 billion in 1961 to 1.4 billion in 2011, global milk output has grown from 332 million tons to 711 million tons. Much of this growth has happened in emerging countries: the combined milk output of China, India, Brazil and Mexico has grown from 29 million tons in 1961 to 205 million tons in 2011. And yet, demand outstrips production in many of these countries, e.g. Mexico, Pakistan and India. Meeting the demand for dairy products is thus a challenge in emerging and developing economies. Dairy farms usually have a large material turnover: large quantities of feed, fertilizer, water and energy are needed for production, and emissions of methane, ammonia, nitrate, phosphate and nitrous oxide result from it. Analyses of dairy farm sustainability done with the RISE method (rise.hafl.bfh.ch) in the above-</p>	<p>Jan Grenz T.b.d.</p>

<p>mentioned countries have shown that there are major improvement potentials concerning the management of feed and manure flows. The pattern and magnitude of environmental impacts strongly differs between pasture-based and feedlot-based dairy production. The significance of e.g. water and land use for dairy production strongly differs between densely- and sparsely-populated areas (e.g. the Punjab vs southern Chile), and according to climate. Research questions: How big is the exact "environmental footprint" of dairy production? What are the differences between different production systems and regions? By how much can environmental damage be reduced through improved management and technology? Answers to these questions shall be sought for three regions with different climate and population density. Data collection will draw upon national and international databases (e.g. FAOSTAT, Global Water Tool), scientific literature and expert interviews with milk farmers, milk buyers and scientists.</p>	
<p>Assess role of animal welfare along the small ruminant value chain The International Livestock Research Institute (ILRI) works to improve food security and reduce poverty in developing countries through research for better and more sustainable use of livestock. ILRI is a member of the CGIAR Consortium which works for a food-secure future. The student would be hosted by the Animal and Human Health AHH program and will be supervised by Dr. Barbara Wieland, and closely work with the AHH team in Ethiopia and national partner organisations of the national agricultural research system (NARS). The proposed project is aligned to the CGIAR research program on Livestock (CRP LIVESTOCK), which work in different value chains around the world. In Ethiopia, the program has been working on the small ruminant value chain since 2012 and has established close links with the NARS. The value chain work is implemented in 7 sites, with 2 villages each and addresses different challenges along the value chain, incl. feeds, breeding, animal health, food safety, market access etc. Aim of project: The project aims to identify animal welfare issues along the small ruminant value chain in Ethiopia in different production systems. The hypotheses are: a) the general knowledge among the different stakeholders is low, leading to unintended poor practices and b) there are different welfare challenges in different production systems (highlands with more sedentary production system compared to agro-pastoralist system in the lowlands)</p> <p>Objectives: · investigate knowledge, attitude and practices of animal welfare among different stakeholders in the small ruminant value chain in Ethiopia · identify and quantify animal welfare issues · identify and validate possible animal welfare indicators in different production systems · develop training material that addresses local needs of different stakeholders</p>	<p>Nancy Bourgeois Lüthi Ethiopia</p>
<p>Development of a sustainable rural agriculture in western cameroon to prevent migration into cities The NGO Shya Lou (CH) in collaboration with the local association "Ceiba Bandrefam" started a project to help support the development of</p>	<p>Judith Peter-Egli Cameroon</p>

<p>sustainable agriculture in a rural region in western Cameroon (French speaking region) with the aim of preventing rural migration to the cities. The self-sufficiency through sustainable production systems with the “motto” help for self-reliance is the aim of the project. Crop and production animal production for self-supply as well as processing and storage of locally produced foodstuffs is a main focus. The local “Université des Montagnes” in Baganté is interested in a collaboration with the two associations in the project.</p> <p>The master thesis will include an analysis of the present situation on the small farms in this rural region with a focus either on animal production or agricultural crops, drawing conclusions which will help defining measures to improve the situation on these farms or to find out what is missing for a sustainable production and profitable farming systems. The farmers will also receive training through the project. The master thesis could paint a picture of a possible future for young farmers in this rural region or help develop production system with a practical orientation, including important points like husbandry systems, biosecurity (how to prevent epidemics), animal health and welfare in general, feeding (use of available feed crops or by-products) etc.. It could also help create a vision for a possible food chain from the production of feed and production animals to slaughter, processing and storage including food safety and marketing of the products.</p>	
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Topics and further information	Contact and Geography
Forestry - Switzerland	
<p>Coppice forestry: a valid alternative forest management option for the future in Switzerland? Considering economic situations and challenges posed by climate change. Literature studies, interviews and some comparative analysis with field observations.</p>	Jürgen Blaser Switzerland

Topics and further information	Contact and Geography
Forestry - International	
<p>Biodiversity conservation and sustainability of private forests in upper Bregalnica, Macedonia Small private forests plots in state forest dominated mountainous regions of Eastern Macedonia</p>	Jürgen Blaser Macedonia

Topics and further information	Contact and Geography
Rural Economics - International	
<p>Designing and evaluating an agricultural program to improve households' food and nutrition security in Côte d'Ivoire There is an increasing trend in agricultural policies to target health-related outcomes which is driven by the importance of agriculture for food security, dietary quality and nutrition. Such programs are particularly relevant for sub-Saharan Africa where undernutrition remains a major concern and where the agricultural sector is dominated by small-scale producers. However, there is little farm-level evidence available that proves the direct link between agricultural support to smallholders and improved nutrition for the farming households. This Master Thesis aims at developing an agricultural program and monitoring framework tailored to small scale farmers in Côte d'Ivoire. The study will include primary data collection and analysis to describe farm production and management characteristics and to assess potential impacts of agricultural support on the farm households' food and nutrition security.</p>	Filippo Lechthaler Côte d'Ivoire
<p>Exploring alternative livelihood opportunities for fishermen and landless people in coastal areas in Myanmar, by maintaining and sustainably using the unique biodiversity. Helvetas - Gulf of Mottama Project (GoMP): One of the project aims is to promote alternative livelihood activities by farmers and landless family (mainly fishermen). Current situation is that most of the farmers are breeding small livestock (goats and pigs) to obtain additional income and some of the landless family members migrate to Thailand in search of better income opportunities. Some of the beneficiaries of the GoMP don't have farm land due to limited land available, landslides or the fact that their main income activities is fishing. Especially the fishermen will face the consequence of introducing more sustainable fishing practices in the Gulf of Mottama. Roughly one third of the total population are fishermen and half of total population are landless in the project area. Therefore, we do need to find alternative livelihoods. This study will conduct a research in the different value chains for fishermen in the</p>	Alessandra Giuliani Myanmar

<p>area (e.g. income from present fishing practices, working as a paid labour on rice farms, fish processing value chains, income from tourism opportunities and other off-farm alternative income opportunities. This topic will consider the effects the introduction of sustainable fishing methods will have on the income for fishermen and will consider appropriate value chains and the potential income opportunities of these alternative livelihoods. By analysing these different options the project aims to reduce migrant population and to get a stable income for fishermen while sustainably managing the natural resources in the Gulf of Mottama.</p>	
<p>Benefit-Cost Analysis of the Ideal Farmers Compare the investment needed to install an irrigation system with all the benefits gain from the increase in the productivity (investment return) and elaborate a type of orchards design. Goal: Increase agricultural productivity with the promotion and installation of irrigation systems as well as agroecological and orchards management trainings Work and life context of the student The student will stay mainly in the ASECSA head office and in the “Tecnología para la salud-TPS” workshop (located 20 minutes away), with field trips of several days or weeks. It is also possible to extend the field stay, according to the student thesis definition. The student will join a dynamic group of 7 people in the head office (between 25 and 55 years old), 5 young technics and supporters that work in several communities. The only language from the team is Spanish. The accommodation in Chimaltenango could be in a family house or we offer a lodging service as well in the ASECSA head office. ASECSA will support in this regard. Location: Chimaltenango (1 hour from the capital and 30 min from La Antigua)</p>	<p>Christoph Studer Guatemala</p>
<p>Participatory Promotion of New Value Chains for the Diversification of Income (Apple processing, Beekeeping, Agritourism, Medicinal Plants) FAO is developing, together with other actors such as SDC, an innovative approach of participatory watershed planning and management in the Atlas Mountains of Morocco (GIBV-MA). HAFL, together with the Centre for Environment and Development (CDE) of Bern University, is backstopping this project. The Midelt region, targeted by the project, is one of the poorest of the country. It is famous for its apple production, produced under irrigation. On the other hand, the level of degradation of the natural resources (erosion and deforestation) is extreme, leading to recurrent natural disasters such as floods and decreased productivity. One of the project's objectives is to develop promising or new value chains that will contribute to the diversification of income of the local population. Apple is the most important agricultural production, but there is no processing of this commodity and losses are important. Other promising value chains are aromatic and medicinal plants, beekeeping/honey and agritourism. The Master student will support a process of participatory market chain approach to develop or improve one selected value chain.</p>	<p>Pascale Waelti Morocco</p>

Topics and further information	Contact and Geography
Cross-cutting questions - Switzerland	
<p>Life Cycle Assessment of lab-grown meat Meat production is associated with substantial environmental damage and resource use. The production of “cultured meat” in the lab is discussed as a possible future solution to this problem. Your thesis revolves around the following questions:</p> <ul style="list-style-type: none"> • What is the state of research on cultured meat? • What is the LCA of cultured meat in comparison to «conventionally» produced meat? • What is the LCA of cultured meat in comparison to «conventionally» produced meat? • What challenges result from the LCA results? 	Jan Grenz Switzerland
<p>Impacts of agri-environment schemes on farm sustainability - trade-offs and synergies All across Europe, and particularly in Switzerland, farmers can participate in agri-environment schemes, implement measures to enhance biodiversity (hedgerows, wetlands, trees, various types of ecological infrastructures) and receive government payments. The efficacy of such systems in fostering biodiversity has been assessed through various studies. To date, the effects of participation in agri-environment schemes on the economic, social and environmental sustainability of the farm as a whole has not been investigated. It is likely that participation induces changes in workload, farm productivity and economics, fodder availability, pest protection and other aspects of farming. There-fore, a holistic rating of the outcome can be considered relevant for a farmer’s decision whether to participate or not, as well as for the optimization of the existing schemes. The student will do whole-farm sustainability analyses for 4-5 farms of different types (arable, with livestock, special crops etc.), comparing scenarios with and without participation in an agri-environment scheme. Consequences of participation on core areas of farm sustainability will be quantified and conclusions drawn.</p>	Jan Grenz Hans Ramseier Switzerland
<p>Ammonia emissions from field application of slurry and slurry after anaerobic digestion using different spreading technologies Field experiments on a commercial farm which operates a methanization plant will be carried out. Spreading technologies include splash plate, trailing hose etc.</p>	Thomas Kupper Switzerland
<p>Development of a solids-feeding device for laboratory fermenters Steam pretreated biomass, with a dry matter content greater than 20% is a viscous, none pumpable slurry. Thus, in order to feed a bioreactor continuously with wet pretreated biomass under aseptic conditions a simple pump cannot be used, but a special feeding device must be designed and constructed, which controls the amount of biomass to be added. The design of the device will be done in collaboration Infors-HT (Bottmingen).</p>	Michael Studer Switzerland
<p>Do plant traits indicate grassland eutrophication over a period of 30 years of regular cutting without fertilization? Post-drought nitrogen pulses (“Birch effect”) and nitrogen deposition (“eutrophication”) may affect grassland species compositions. Shifts in vegetation structure may result in an increased abundance of species</p>	Andreas Stampfli Switzerland

<p>with resource-acquisitive traits and in a decreased abundance of species with resource conservative traits, as reflected by specific leaf area, SLA. Specific information on SLA or other plant traits will be collated from a global data base and used together with species abundance data over 30+ years (1988-2017, 2018) to calculate community weighted means (CWM) of plant traits for nine permanent plots of the species-rich hay meadow at Negrentino (site listed as a TWW of Swiss national importance). Local precipitation data will be used to quantify growing season droughts for 1988-2017. Thirty-year trends for CWM SLA and for single dominant species, and species groups (grasses, forbs, legumes) will be analyzed to test the hypothesis that nitrogen deposition and post-drought nitrogen pulses affect grassland productivity and species compositions despite of regular harvesting without use of fertilizer.</p>	
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Topics and further information	Contact and Geography
Cross-cutting questions - International	
<p>Impact de la médaille du Concours des produits du terroir SUJETS PRIORITAIRES POUR L'ANNEE 2018-2019</p> <ul style="list-style-type: none"> • Impact technico économique des produits médaillés du Concours (étude consommateur) • Impact des médailles et du Concours des produits du terroir sur les producteurs (évaluation économique, qualité, procès de production, etc.) • Le Concours des produits du terroir comme moyen d'intégration des filières ou produit : adhésion des différents acteurs et impact • Accompagnement d'un médaillé pour l'amélioration d'un ou de plusieurs aspects pour une meilleure commercialisation de son produit : DLC, emballage.... • Formulation et caractérisation d'un produit de terroir : ex : Bsissa à base de blé germé <p>AUTRES SUJETS POSSIBLES</p> <ul style="list-style-type: none"> • Etude d'impacts de la labellisation AOC d'un produit agricole sur le développement local d'un territoire. • Analyse diagnostic de la chaîne de valeur figue de barbarie au Centre-Ouest de la Tunisie : les préalables au développement d'un cluster Cactus • Etude de la performance des entreprises créées suite à la labellisation des produits de terroir • Caractérisation, optimisation et valorisation de la pâte de dattes • Extraction d'huile essentielle à partir de plantes sauvages de la région de Tabarka et son utilisation dans des produits laitiers et carnés traditionnels 	<p>Nancy Bourgeois Lüthi Tunisia</p>
<p>Assessing the potential of various land management approaches and practices for carbon sequestration and emission reductions in a remote area in Northwestern Australia. Kachana (http://www.kachana.com), a small private company/project led by two emigrated Swiss families and committed to restorative land care, manages 77'500 ha of land in a remote area (only accessible by aircraft, horseback or foot) approximately 120 km South-West of Kununurra WA, Australia (-16.44327, 127.78312). The objective of the</p>	<p>Christoph Studer, Jürgen Blaser Australia</p>

<p>pursued management approach (which is inspired by the holistic management approach ideas of Alan Savory) is to stabilize the eroding resource base (stop land degradation, in particular soil erosion, and improve water resources management) and to revitalize the landscape so that the area can meet human demands.</p> <p>Many of the implemented land management practices (such as prevention of bush fires, controlled herd management, erosion control or rainwater management) obviously have the potential to mitigate climate change through reduced greenhouse gas emissions and enhanced carbon sequestration. The objective of the Msc thesis is to identify on a scientifically sound basis the mitigation potential of various management practices in view of possibly becoming eligible to receive carbon abatement subsidies. The research work will involve a site visit and modeling of the effects of selected management practices on carbon sequestration and emission reductions. Certain supporting data for the thesis work (such as e.g. satellite images) is available within Kachana.</p>	
<p>Quantifying the environmental footprint of dairy production and the potential for reducing it</p> <p>The global importance of dairy farming has grown for decades. According to FAO statistics, the number of dairy cattle has increased from 0.9 billion in 1961 to 1.4 billion in 2011, global milk output has grown from 332 million tons to 711 million tons. Much of this growth has happened in emerging countries: the combined milk output of China, India, Brazil and Mexico has grown from 29 million tons in 1961 to 205 million tons in 2011. And yet, demand outstrips production in many of these countries, e.g. Mexico, Pakistan and India. Meeting the demand for dairy products is thus a challenge in emerging and developing economies.</p> <p>Dairy farms usually have a large material turnover: large quantities of feed, fertilizer, water and energy are needed for production, and emissions of methane, ammonia, nitrate, phosphate and nitrous oxide result from it. Analyses of dairy farm sustainability done with the RISE method (rise.hafl.bfh.ch) in the above-mentioned countries have shown that there are major improvement potentials concerning the management of feed and manure flows. The pattern and magnitude of environmental impacts strongly differs between pasture-based and feedlot-based dairy production. The significance of e.g. water and land use for dairy production strongly differs between densely- and sparsely-populated areas (e.g. the Punjab vs southern Chile), and according to climate.</p>	<p>Jan Grenz Worldwide</p>
<p>Impact of the invasive aster, <i>Ageratina adenophora</i> (Spreng.) King. & H. Rob. (Compositae) in the Rio Chillar valley in southern Spain</p> <p>The invasive aster, <i>Ageratina adenophora</i>, a thermophilic species was first detected in the Nerja area of southern Spain in the 1990s. (Vesperinas et al 2001) The River Chillar rises in the Sierra Nevada and discharges into the Mediterranean near Nerja, Malaga Province. The Nerja area has experienced a greater than 0.5 degrees increase in mean annual temperature since 1970 with most of this attributed to an increase in the minimum night temperatures (Vesperinas et al 2001). Observations of changes in the distribution or growth of plants and establishing this relationship with temperature can be used to estimate</p>	<p>Lindsey Norgrove Spain</p>

<p>how plant distributions might alter with increasing temperatures in other parts of Spain</p>	
<p>Supporting farmers with existing practices of on-farm tree cultivation in the endangered biosphere reserve around Inle Lake to generate economic benefits for the communities and the conserving the environment</p> <p>The Inle lake is an endangered biosphere reserve. Among other things the lake's surface has been shrinking from 270km² in 1934 to 160km² today as a result of deforestation, soil erosion and sedimentation. Pwe Hla is one of Inle lake's northern watershed areas. Agriculture dominates the region and land use practices such as tree coverage have a direct impact on the lake downstream. Farmers in Pwe Hla cultivate trees on their farmland while the neighbouring communities do not. On-farm tree cultivation (synonymously used with agroforestry) has many well known benefits for farmers' livelihoods and the environment. At the same time it can be an effective afforestation method which is of particular relevance for watersheds such as Pwe Hla. Spreading existing practices of on-farm tree cultivation across the region, would generate significant benefits for farmers and the conservation of Inle lake. The hosting organisation is a local NGO</p>	<p>Alessandra Giuliani Myanmar</p>

Topics and further information	Contact and Geography
Food Systems - International	
<p>Designing and evaluating an agricultural program to improve households' food and nutrition security in Côte d'Ivoire</p> <p>There is an increasing trend in agricultural policies to target health-related outcomes which is driven by the importance of agriculture for food security, dietary quality and nutrition. Such programs are particularly relevant for sub-Saharan Africa where undernutrition remains a major concern and where the agricultural sector is dominated by small-scale producers. However, there is little farm-level evidence available that proves the direct link between agricultural support to smallholders and improved nutrition for the farming households. This Master Thesis aims at developing an agricultural program and monitoring framework tailored to small scale farmers in Côte d'Ivoire. The study will include primary data collection and analysis to describe farm production and management characteristics and to assess potential impacts of agricultural support on the farm households' food and nutrition security.</p>	<p>Filippo Lechthaler Côte d'Ivoire</p>

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