International workshop for students:
REVITALIZATION OF ABANDONED AGRICULTURAL LAND USING SUSTAINABLE FARMING METHOD AND ANIMAL HEALTH

19th – 21st June, 2014

University of Ljubljana, Veterinary Faculty

Ljubljana, SLOVENIA

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REVITALIZATION OF ABANDONED AGRICULTURAL LAND USING SUSTAINABLE FARMING METHOD AND ANIMAL HEALTH

Mednarodna delavnica za študente
REVITALIZACIJA RABE OPUŠČENIH KMETIJSKIH ZEMLJIŠČ S SONARAVNIMI NAČINI REJE IN ZDRAVSTVENO VARSTVO ŽIVALI

19th – 21st June, 2014

Edited by:
Jože STARIČ

University of Ljubljana, Veterinary Faculty
Ljubljana, SLOVENIA
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FOREWORD

This brochure was compiled for international workshop for students, an activity carried out at the Veterinary faculty as part of the project Internationalization of University of Ljubljana, which was co-financed by the European Union from the European Social Fund and the Ministry of Education, Science and Sport of Slovenia. The brochure is intended as a guide to sustainable recultivation of abandoned farmland using grazing animal as a tool. Multidisciplinary approach covering many aspects of the topic was employed. Invited speakers, established experts, from abroad and different faculties within the University of Ljubljana were kindly contributing to the publication. It is expected that the guidelines will be useful for both present and prospective stakeholders and professionals dealing with this issue.

Wide dissemination of the brochure is encouraged.

Jože STARIČ, Project leader at the Veterinary faculty
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Dr. Ferdinand Ringdorfer, PhD
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Assist. Prof. **Suzana ŽIŽEK**, PhD

Laboratory for environmental research, University of Nova Gorica
**PROGRAMME**

**Thursday, 19. 6. 2014** (Veterinary Faculty, Ljubljana – Clinical lecture hall)

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<td>9.00-9.45</td>
<td>M. POGAČNIK: Sustainable recultivation - the way of life</td>
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<td>9.45-10.30</td>
<td>D. KOMPAN: The importance of animal genetic resources: in animal husbandry</td>
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<td>M. VIDRIH: Silvopastoral use of grassland – good for environment, soil and animals</td>
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<td>12.30-13.15</td>
<td>M. GOLOBIČ: Landscape potentials and limitations for land use on Karst</td>
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<td>14.45-16.15</td>
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<td>F. BATIČ, D. KOMPAN, M. VIDRIH: Pasture walk: botanical composition and fodder value of selected plants from the grasslands of Vremščica</td>
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<td>J. STARIČ: Current infectious diseases of small ruminants in Slovenia</td>
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<td>11.00-11.45</td>
<td>P. SEKULOVSKI: Microbiological safety of food of animal origin in extensive animal breeding – meat and meat products</td>
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<td>B. JAKOVAC STRAJN: Nutritional disorders of small ruminants</td>
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<tr>
<td>12.30-14.00</td>
<td>J. STARIČ et al.: Workshop conclusions</td>
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SUSTAINABLE RECYCLING - THE WAY OF LIFE

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Regional and global environmental problems have significant impact on the environment as well as people living in such environment. Consequences of bad management of the environment are:

- loss of fertile land because of overgrowing or erosions,
- loss of plant and animal biodiversity,
- lack of appropriate tools and knowledge about sustainable agricultural policies.

Environmental problems are especially important in low productive mountainous and karst regions.

Main causes for that are: natural low biomass production, ground water quality and quantity, loss of useful pastures and agricultural land, deagrarisation and depopulation.

Goals of many countries are: Development of the methods for the assessment of the vulnerability of eco-systems and for the assessment of the rate and extent of land use change; creation of the foundations for the development of sustainable agriculture; organisation of revitalization programmes of the area.

These goals could be achieved by implementation of the programmes of sustainable recultivation.

WHAT IS SUSTAINABILITY?

Meeting human needs fairly and efficiently, giving priority to basic needs; reducing dependence on non-renewable energy sources and those energy sources that have detrimental effects on human
and environmental health; increasing the efficiency and productivity of natural resources; reducing dependence on synthetic compounds that do not break down in nature; reversing the decline of natural resources etc.
THE IMPORTANCE OF LANDSCAPE BALANCE FOR SUSTAINABLE DEVELOPMENT

POMEN VZDRŽEVANJA POKRAJINSKEGA RAVNOVESJA ZA TRAJNOSTNI RAZVOJ

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Trajnostni razvoj moramo razumeti tudi kot iskanje pogojev za ohranjanje ali ustvarjanje pokrajine, ki izkazuje optimalno uravnoteženost z vidika funkcionalnih, ekoloških in kulturnih vrednot. Temeljni cilj je namreč kvalitetna in vitalna pokrajina, ki bo ekološko uravnotežena, predvsem pa s posegi in aktivnostmi ne bi smeli presegati njenih regeneracijskih sposobnosti, ki pa se razlikujejo glede na občutljivost posameznih območij oziroma njihovih sestavin. Na delavnici bo opozorjeno na nekaj naravnogeografskih značilnosti, ki vplivajo na pokrajinsko občutljivost.

Koncept trajnosti v bistvu izvira iz ekosistemskega razumevanja pokrajine, kar pomeni, da upoštevamo mrežno povezanost, prepletetno in soodvisnost vseh dejavnikov in pokrajinotvornih sestavin, kjer lahko poseg ali sprememba v eni povzroči včasih tudi nepredvidljive učinke in posledice na ostalih.
Pomembno je najti mehanizme za zagotavljanje dolgoročnega pokrajinskega ravnovesja in ohranjanja ekosistemske dinamike, ki bo omogočila, da bo okolje sposobno prenesti spremembe za socialni, gospodarski in tehnološki razvoj, a le do meje nosilnosti okolja. Ravnovesje se poruši ob človekovih posegih, ki so premočni ali, ko gre za hitre spremembe oziroma vplive aktivnosti, ki součinkujejo ali se sinergijsko dopolnjujejo ter spremiščajo snovno-energetske pretoki skozi ekosistem. Zahtevan strokovni izziv je odgovor na vprašanje, kje je prag oziroma kritična točka, ko ekosistem s svojimi mehanizmi ne bo več zmožen vzpostaviti dinamičnega ravnovesja? Problem je še v tem, da se nekateri ekosistemi hitro odzovejo na spremembe, drugi pa z zamudo oziroma zamikom, nekateri s predhodnimi opozorili, druge brez njih. Čas odziva oziroma časovni zamik je odvisen predvsem od raznolikosti in kompleksnosti ekosistema. Enostavnjejši ekosistemi se na spremembe odzovejo hitreje, njihov prag vzdrževanja dinamičnega ravnovesja je nižji. Ekosistemi, ki imajo več sestavin – so bolj pestri, se spremembam lažje prilagodijo in hitreje vzpostavijo novo ravnovesje oziroma so dalj časa sposobni vzdrževati dinamično pokrajinsko ravnovesje, kar pomeni, da se na zunanj vplive adaptirajo, jih absorbirajo oziroma jih nevtralizirajo in ustvarijo novo ravnovesje. Kompleksnejši in raznovrstni sistemi so torej prožnejši in sposobni dalj časa vzdrževati ravnovesje.
V tej luči lahko razumemo trajnostni razvoj tudi kot vzdrževanje dinamičnega ravnovesja med naravnim potencialom oziroma regeneracijskimi sposobnostmi okolja in človekovimi posegi, ki so v funkciji izboljšanja njegovih materialnih in socialnih potreb.

Kako pa deluje narava, da je skozi daljše časovno obdobje zmožna ohranjati ravnovesje? Naravni ekosistemi so v evoluciji dokazali, da imajo regulatorje svojega delovanja, ki jih vzdržujejo v dinamičnem ravnovesju in jim s tem zagotavljajo preživetje tudi ob spremembah.

Na delavnici bodo predstavljeni nekateri od teh regulatorjev oziroma ekosistemskih mehanizmov ravnovesja, ki imajo vzgleda v delovanju naravnih ekosistemov in lahko služijo tudi kot vzorci in vzori za človekovo delovanje in posege v okolje. Njihova uporabnost za načrtovanje trajnostnega razvoja dejavnosti, ki je osrednja tema pričujoče delavnice, bo ponazorjena ob praktičnih primerih. Med najpomembnejšimi regulatorji naravnih ekosistemov so: neodvisnost funkcije od količinske rasti, neodvisnost funkcije od proizvoda, reciklaža, posnemanjem naravnega vzorca, predvsem pa negativna (pozitivna) povratna zanka.

LANDSCAPE POTENTIALS AND LIMITATIONS FOR LAND USE ON KARST

KRAJINSKI POTENCIALI IN OMEJITVE ZA RABO NA KRASU

Mojca GOLOBIČ

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V nadaljevanju bomo predstavili koncept ustreznosti prostora, ki omogoča celovit pristop k razvoju in varovanju (slika 1). Pristop je razdeljen na dva vidika: analizo potencialov prostora in analizo ranljivosti. Pri prvi iščemo prostorske potenciale za razvoj neke dejavnosti, z drugim pa odkrivamo lastnosti prostora, zaradi katerih bi lahko prilagodila (pre)velikih negativnih vplivov na okolje. Obe analizi lahko modeliramo v GIS in rezultate prikažemo na kartah. Take karte so uporabne v postopkih prostorskega načrtovanja pri razporejanju dejavnosti, prav tako pa tudi kot izhodišče za upravljanje krajine in oblikovanje usmeritev za izvajanje dejavnosti, še posebej na zelo ranljivih območjih.

Slika 1: Prerez doline P. Geddesa (1909) prikazuje idejo ustreznosti


- zadrževanje spontanega zaraščanja in s tem omogočanje ohranitve značilnih rastlinskih združb in botaničnih posebnosti,
- vzdrževanje vinogradništva, sadjarstva pa tudi živinoreje za ohranjanje pašnikov in travnikov ter posredno suhozidov,
- usmerjanje sodobne oblike kraških melioracij,
- ohranjati njive v vrtačah,
- usmerjati pozidavo v obnovi hiš v vasah tako, da sledi tipičnim prostorskim smerem in značilnim oblikam vasi.
Kras ima potenciale za razvoj številnih kmetijskih dejavnosti in turizma; privlačen pa je tudi za poselitev. Geografska lega je privlačna za umesčanje različnih tranzitnih infrastrukturnih povezav, zaradi naravnih danosti (sorazmerno dobra osončenost in prevetrenost) pa je zanimiv tudi za rabo obnovljivih virov energije. Vse te dejavnosti pomenijo za kraško krajino velike obremenitve. Potencialni vplivi vključujejo onesnaženje podzemnih voda, degradacijo kulturne krajine in krajinske slike, slabšanje bivalne kakovosti in zmanjševanje biotske pestrosti. V drugem delu predavanja bo prikazanih nekaj primerov umesčanja različnih dejavnosti na območje Krasa ter analize ustreznosti, s katerimi si lahko pomagamo pri zmanjševanju njihovih vplivov (slika 2).


Literatura:


SILVOPASTORAL USE OF GRASSLAND – GOOD FOR ENVIRONMENT, SOIL AND ANIMALS

DREVESNO PAŠNA RABA – DOBRO ZA OKOLJE, TLA IN ŽIVALI

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Premišljeno zastavljena drevesna pašna raba ima v primerjavi z izključno pašno rejo domačih živali na odprttem travinju številne ekonomske, socialne in ekološke prednosti. Še posebno velja to v spremenjenih okoljskih in družbenih razmerah in te so za naš kras značilne že zadnjih 20 let. Seveda mora biti ta oblika rabe naravnih virov naravnana tako, da s kar najmanjšim finančnim vložkom dosega optimalno proizvodnjo vseh treh gradnikov na čim bolj sonaraven in trajnosten način. Pridelava različnih vrst proizvodov na eni površini, kot so les, meso, mleko, plodovi in še mnogi drugi, omogoči boljše prilagajanje tržnim razmeram ter s tem večjo konkurenčnost na trgu. Z izbijo tržno zanimivih elementov in s premišljenim gospodarjenjem lahko drevesno pašna raba predstavlja pomemben dodaten vir dohodka na kmetiji. Ob tem pa na svoj račun pa seveda pride tudi naravna pestrost živalskega in rastlinskega sveta, ki se lahko ohranja tudi za kasnejše generacije.

V zmerni klimi so lesnate rastline tista najvišja oblika vegetacije, ki prevladajo nad vsemi drugimi rastlinami, če ne zaviramo njihovega širjenja s pašo, košnjo, sekanjem ali požiganjem. Tam, kjer so rodovitna zemljišča in dovolj ugodne razmere za varno delo s stroji za oskrbo tal in košnjo ruše, na taka zemljišča verjetno še nekaj časa ne bomo pustili, da bi se razširile lesnate rastline. Grmovje in drevesa namreč ovirajo strojno oskrbo ruše in spravilo pridelka ter zmanjšajo pridelovalno zmogljivost travinja, izraženo v pridelku mrve. To se zgodi takrat, kadar je njihova gostota tako velika, da je bistveno zmanjšana količina sončne svetlobe, ki prispe do ruše. Kmetijska zemljišča porasla z gozdnim drevjem bomo zato našli tam, kjer košnja ruše s stroji ni mogoča oziroma ni
Varna zaradi razgibanosti ali nagiba zemljišča. Tudi tja, kjer je zemlja zelo siromašna na rastlinskih hranilih in bi bila kakovost pridelane krme zelo slaba, se bodo lesnate rastline še vedno širile. Padavin in toplote je tudi v teh območjih dovolj za uspešno rast lesnatih vrst rastlin. Zaradi globljih in bolj razvejanih korenin, so v prednosti pred zelnatimi rastlinami pri oskrbi z vodo in rudninami iz tal. Ker so višje in če imajo mir pred nami in živalmi ter so varovane pred požari, so lesnate rastline tudi v prednosti pri tekmovanju za svetlobo pred rastlinami ruše.

Pašniki, ki so poraščeni z drevesi, imajo na krasu veliko prednost, kajti krošnje ščitijo travno ruše pred žgočim soncem in s tem podaljšajo pašo v času nastopa sušnega obdobja. Poleg tega veje z listjem nudijo dodaten vir krme za pašne živali. Prisotnost dreves na pašniku izboljšuje bivalne razmere za živali, saj jih drevesa varujejo pred neugodnimi vremenskimi vplivi. Krošnje jih ščitijo pred preveliko količino padavin, močnim vetrom in žgočim soncem. Posledično dobro počutje živali ugodno vpliva na njihovo proizvodno sposobnost. Z nadzorovano pašo živali nadzirajo rast in razvoj travne ruše ter s tem zmanjšujejo potrebo po mehanskem ali kemičnem zatiranju nezaželenih rastlin. Izbor primernih kmetijskih in gozdnih zemljišč za vzpostavitev drevesno pašnega sistema zahteva skrbno presojo, ki vključuje tesno sodelovanje kmetijcev, gozdarjev in drugih zainteresiranih skupin. Drevesa in grmovje na pašniku so lahko v korist kmetijskemu zemljišču, živalim in ljudem, samo vedeti je treba za kakšen namen bodo tam lesnate rastline raste. Njihova vzgoja na pašniku mora biti tako vodena, da ne bo bistveno zmanjšana rast zelnatih rastlin, ki sestavljajo rušo. Del pašnika, ki je poraščen z lesnatiimi rastlinami mora biti urejen kot samostojna ograda s stalno elektroograjo, ali odgrajen z začasno elektroograjo od ostalega dela pašnika. Tako bomo dosegli, da bodo živali tisti del pašnika z lesnatimi rastlinami čim bolj enakomerno popasle ali vsaj pregazile podrost med grmovjem in pod drevesa ter ga tudi enakomerno pognijile z izločki. Na del pašnika z lesnatimi rastlinami premestimo živali ali jim dovolimo pristop tja šele tedaj, ko druguje zmanjka zeljina za pašo, ali ko bo treba zmanjšati količino krvave na zemljišču v pasu povečane požarne ogroženosti. Napačno je, če imajo živali ves čas dostop na tisti del zemljišča, kjer rastejo drevesa ali grmovje, ker se bodo tam zadrževale tudi takrat, ko to ne bo potrebno, torej iz navade in na tistem mestu pustile preveč izločkov ter povzročile trganje ruše. Marsikje po svetu in Evropi je tradicionalno v uporabi sistem drevesno-pašne rabe travinja, kjer se izkazujejo pozitivni učinki gozdnega drevja na produktivnost in trajnostno rabo travinja. Drevje primerne gostote pozitivno vpliva na preprečevanje erozije vode in vetra, biotsko pestrina, počutje domačih živali, estetski izgled krajine, povečuje vzgoj ogljika v tla in nadzemno biomaso, vpliva pa tudi na celokupno produktivnost in povečuje multifunkcionalnost tekega ekosistema. V Sloveniji močno prevladujejo območja z omejenimi dejavniki za kmetijstvo, ki zahtevajo manj intenzivno kmetijsko
proizvodnjo ter izraženo kmetijsko-okoljsko funkcijo. Vse to pa lahko nudi tudi drevesno pašna raba.
BOTANICAL COMPOSITION AND FODDER VALUE OF SELECTED PLANTS FROM THE GRASSLANDS OF VREMŠČICA

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Grasslands at the mountain Vremščica are botanically very diverse due to special phytogeographical position of the area in the border between Dinaric, Alpine and Submediterranean area. On the meadows and pastures of eastern slopes above Košana valley typical Middle Europen species are still present, but already there, and then even more at the top and southern slopes elements of Dinaric-Submediterranean flora prevail belonging to the alliance Scorzonietalia villosae. Sintaxa, which appear on these areas depend on soil characteristics, altitude and land use type history. Apart from grasses, legumes and herbs, suitable for livestock grazing or hay production and frequent medicinal plants several known poisonous species or suspected to be poisonous to livestock appear. These plants represent danger to the livestock and some cases of deadly intoxications of animals has been evidenced in last years. In other to prove the contents of some chosen alkaloids and other toxic substances the following species have been sampled: Trifolium montanum L., Genista sericea Wul., Genista sylvestris Scop., Genista tinctoria L., Chamaespartium sagittale (L.) P. Gibbs, Lathyrus linifolius (Rehb.) Baesler, Vicia villosa Roth., Medicago minima (L.) Grufo., Dorycnium germanicum Greml) Rouy., Coronilla vari L., Inula salicina L., Euphorbia cyparissias L., Thalictrum minus L., Ranunculus illyricus L., Pseudolysimachion barrelieri Schott ex Roem. & Schult., (Rhinanthus glacialis Personnat, Galium mollugo L., Vicia cracca agg., Lembotropis nigricans (L.) Griseb., Lathyrus latifolius L.. Species printed in bold are known or suspected on their content of isoquinoline alkaloids which were also determined in blood and remnants of fodder in guts of some died horses in the stable of Lipica.
THE IMPORTANCE OF ANIMAL GENETIC RESOURCES: IN ANIMAL HUSBANDRY

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Awareness of the importance of biodiversity in all areas is becoming increasingly accepted, and so also in animal husbandry. Erosion of local breeds has been particularly strong over the past 70 years, which led to the disappearance of many species on our planet. Awareness of the importance of conservation and use of indigenous breeds on the global and regional levels of biodiversity loss is a slow process, but it is not stop and will continue in spite of stronger actions and actions of individual countries in this field. Conspiracy and action at the global level are becoming more successful, because the necessity to conserve biodiversity in livestock supported by numerous studies and actions that lead to global, regional and national level. With this contribution we want to display the development and course arrangements relating to the conservation of biodiversity at various levels and highlighted the importance of preserving indigenous breeds for milk production and future production of livestock products, the Food and Agriculture in the world and in every country are very important.

It is important for the conservation of indigenous breeds in the original environment, using traditional breeding techniques according to the principles of sustainable development, the implementation of breeding and selection programs Conservation practices of indigenous breeds in-situ conservation organization and implementation is also carried out ex situ (in vivo and in vitro), but there are significant differences between species. There are numerous software and strategic documents, treaties, strategies, laws and regulations in the world, the EU and Slovenia, which are the result of joint efforts to regulate the field, which he briefly called Conservation of biodiversity in livestock (probably), and is often used the term "gene bank in animal husbandry."
POMEN BIOTSKE RAZNOVRSTNOSTI V REJI ŽIVALI

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Zavedanje o pomenu biotske raznovrstnosti na vseh področjih postaja vse bolj sprejeta, in tako tudi v živinoreji. Erozija lokalnih pasem, ki je bila še posebej močna v zadnjih 70 letih, kar je privedlo do izginotja številnih vrst na našem planetu. Zavedanje o pomenu ohranjanja in uporabe avtohtoni pasem na globalni in regionalni ravni izgube biotske raznovrstnosti, je počasen proces, vendar pa se ne ustavi in se bo še naprej kljub močnejših ukrepov in ukrepov posameznih držav na tem področju. Dogovarjanje in ukrepanje na svetovni ravni se vedno bolj uspešna, saj je potreba po ohranjanju biotske raznovrstnosti v živinoreji v številnih študij in ukrepov, ki vodijo k globalni, regionalni in nacionalni ravni podpira. s tem prispevkom želimo prikazati dogovore za razvoj in programe v zvezi z ohranjanjem biotske raznovrstnosti na različnih ravneh in izpostaviti pomen ohranjanja avtohtoni pasem za proizvodnjo mleka in prihodnjo proizvodnjo živalskih proizvodov za prehrano in kmetijstvo v svetu in v vsaki državi so zelo pomembni.

Pomembno je ohranjanje avtohtonih pasem v izvornem okolju, z uporabo tradicionalnih tehnologij reje po načelih trajnostnega razvoja, izvajanje rejskih in selekcijskih programov Postopki ohranjanja avtohtonih pasem in-situ, izvajanje in organizacija ohranjanja pa se izvaja tudi ex situ (in vivo in in vitro), obstajajo pa velike razlike med vrstami. Obstajajo številni programski in strateški dokumenti, mednarodne pogodbe, strategije, zakoni in predpisi na svetu, v EU in Sloveniji, ki so rezultat skupnih naporov za ureditev področja, ki mu na kratko rečemo Ohranjanje biotske raznovrstnosti v živinoreji (BRŽ), pogosto pa se uporablja tudi izraz »Genska banka v živinoreji«.
SUSTAINABLE, INNOVATIVE GRAZING SYSTEM WITH SHEEP ON ALPINE MEADOWS

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In recent decades, a significant decrease in Alpine pastures is recorded. The area of alpine pastures and alpine hay meadows decreased by 20%, overall extensively used areas even by 40%. The Austrian Minister for Agriculture, Forestry, Environment and Water pursues a clear goal: a livable Austria. This includes an intact nature and cultural landscape. It also includes a rational land management of pasturelands.

Each project starts with a vision. In the specific case involved a revival or an ecological restoration of pastures around the Hauser Kaibling, a ski mountain in Styria. In this alpine area up to 1,000 sheep have been in the 50s. This number has decreased dramatically. The vision of Chairman Walter Schmiedhofer, he is chairman of the Ennstaler lambs producers association and of Sheep and Goat Breeding Association Styria, was that, first, again more sheep come to the mountain and secondly with the Almlamm a product available for the market, from which conventional goods is different and can thus more marketable.

The Alpine sheep farming is often in conflict with landowners, with hunting or tourism. Sheep know no boundaries and in the free grazing of pastures basic limits may be exceeded, even once, not always the landowners agree. The hunt is located in the Alpine region and occasionally sheep production is called a disorder of the hunt. For tourism sheep can be a problem if for example a mountain peak is totally dirty with sheep excreta, so that the walker cannot settle. The point is, to keep more sheep in Alpine pasture area and to convince all possible interested parties to the vision. Above all, it is about the sheep farmers whose sheep are supposed to spend the summer on the pasture. The welfare of animals stands at the forefront. It must be recognized a benefit for everyone.
As with all projects, careful planning is the half step to success. Even with a project with several project partners. It should be clarified which areas are available. The grazing system and the number of sheep have to be adapted to the food supply. An adequate water supply must be ensured. An accommodation for the shepherd must be provided.

The planning starts on the home farm of sheep farmers. Which animals are indented for the Alpine pasture, are the animals all perfectly healthy, what is left to do?

The movement pattern of a flock of sheep is influenced by the grazing system. In free motion, that means the sheep can go wherever they want, a clear pattern during the day can be seen. Free grazing sheep are early birds who already be active at the beginning of dawn. Between 10:00 to 14:00 clock, the movement reduced, then increased again until 18:00 clock. The animals return very often back in the range of already used overnight camps.

The yield and forage quality of Alpine pastures are very much determined by the vegetation types, which are found on the alps. Yield and forage quality decline with increasing altitude. Depending on pasture methods, it may temporarily even lead to a negative energy balance. This is especially true when the sheep have to make a recultivation work. A short-term under-supply can be bridged well by the sheep through mobilization of body reserves. However, it is to ensure that the resources can be replenished.

By targeted grazing a very good success can be achieved in the improvement of pasture forage quality. This is shown very clearly by results of exact studies of the vegetation.

A further motivating factor in the application of this project was the product lamb meat. The fleshy pronounced carcasses produced by stabling with meat breeds of sheep cannot be compared with mountain grazing lambs, this was clear from the outset. Therefore meat quality was one interest in the studies, which were carried out at AREC Raumberg-Gumpenstein, especially the fatty acids. Meat from Alpine lambs had better results than fattened lambs in the barn.
WELFARE AND MANAGEMENT IN SHEEP

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Welfare in sheep includes all aspect of animal husbandry and management. In the present study, issues like pain, food and water supply, housing, handling, transport, castration, tail docking, slaughtering are not covered. The present study will mainly deal with sheep welfare and management on pasture related to disease and predation.

Sheep are kept under a variety of climate and environmental conditions. Diseases and management are related to factors such as age, immune status, transportation, handling, pasture, stress, prophylactic treatment, purchase of animals, anthelmintic resistance, seasons, and geographical areas. In some areas predation related to carnivores may be an important factor for pasture losses. For instance, in Norway, 30,000–40,000 lambs are annually killed by predators, mainly due to lynx and wolverines.

In Norway, the overall loss on pasture in lambs and adults are around 9 % and 3% respectively. In adults, the main losses are due to mastitis and other diseases post partum, while in lambs arthritis, feet disorders, gastrointestinal (including parasites) diseases, septicaemia/pyaemia, pneumonia, and enterotoxaemia are the main conditions. Prophylactic treatments in Norway against gastrointestinal nematodes, clostridial infections, pneumonia and ectoparasites are common.

Losses on pasture due to diseases could be divided into infections, intoxications, and deficiency diseases. The main deficiency disorders are Ca, Mg, Cu, I, Co (vit B12) and Se (vit E) deficiencies. Similarly, the main intoxications on pasture are photosensitization (alveld – bog asphodel), Cu-poisoning, and plant poisons due to consumption of for instance acorn, Rumex spp, Rhododendron spp, and fungi. The most common infections on pasture are mastitis, gastropathy, enterotoxaemia,
septicaemia, pyaemia, malign oedema, pneumonia, tick-borne fever, and different parasites causing diseases such as coccidiosis, heminthiasis, fascioloiasis, and myiasis externa.

In order to do proper management on pasture the farmer should follow several guidelines such as: prophylactic treatment, inspection of pasture/animals, clarify causes of death, and diagnose/treat diseased animals. In addition, if there is an increased risk of disease, animals should be inspected more frequently to detect disease/death as soon as possible to prevent further losses. Good and accurate registrations (prophylactic treatment, medicines used, disease records etc) are important and necessary in prophylactic and welfare management. Reasons for death, culling and replacement should be maintained on all farms. The farmer should identify the main challenges on the pasture. In order to do proper management, details on weight, condition score and health status are also important.
VECTOR-BORNE INFECTIONS IN SMALL RUMINANTS

A FOCUS ON ANAPLASMA PHAGOCYTOPHILUM INFECTION IN SHEEP

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Several vectors could spread infections in small ruminants, such as flies, human (needles etc), midges, mosquitos, and ticks. The present presentation will focus on ticks and tick-borne infections, although infections transmitted by for instance midges (such as Bluetongue virus and Schmallenberg virus) may also be important in some areas of Europe.

Tick-borne infections in small ruminants may involve borreliosis (caused by Borrelia burgdorferi s.l.), tick-borne encephalitis (TBE) /Louping-ill (LI) (caused by TBE/LI virus), anaplasmosis (caused Anaplasma ovis/mesaeterum), and tick-borne fever (TBF) (caused by Anaplasma phagocytophilum). Other important infections such as Q-fever (caused by Coxiella burnetii) and tularaemia (caused by Francisella tularensis) may also occasionally be transmitted by ticks. The present presentation will focus on A. phagocytophilum infection in sheep.

The bacterium A. phagocytophilum (formerly Ehrlichia phagocytophila) may cause infection in several animal species including human. The infection is widespread on I. ricinus pasture in Europe. The disease in domestic ruminants is also called TBF, and has been known for at least 200 years in Norway. In Europe, the bacterium is transmitted mainly by the tick I. ricinus.

Infections by A. phagocytophilum are common in domestic ruminants and cervids in the coastal areas of southern Norway. At least 300 000 lambs have been estimated to be infected with A. phagocytophilum each year. The infection is one of the main scourges of the Norwegian sheep industry and cause considerably welfare and economic impact. Fatal outcome of A. phagocytophilum infection has also been diagnosed in moose and roe deer. Sporadic infection in cats, dogs and horses has also been reported.
A. phagocytophilum infection in sheep may cause very high fever, cytoplasmatic inclusions in phagocytes and severe neutropenia. TBF is seldom fatal unless complicated by other infections. Complications include abortions, and impaired spermatogenesis in rams for several months. However, the most important aspect of the infection in sheep is its implication as a predisposing factor for other infections. In a Norwegian study comprising 400 post mortem cases of TBF in sheep, nearly 90 percent of the deaths were due to secondary bacterial infections, mainly from septicaemia (especially Bibersteinia trehalosi), pyaemia and pneumonia. The mechanism by which A. phagocytophilum causes immunosuppression is not clearly understood.

The diagnosis is made by blood smear microscopy, PCR analysis, cultivation, immunhistochemistry and serology. Splenomegalia with subcapsular bleedings is associated with an A. phagocytophilum infection. No vaccines for protection against either I. ricinus or A. phagocytophilum are available. For the treatment, the drug of choice is tetracycline. In endemic areas, regular dipping or treatment with pyrethroids against ticks may be necessary.

A. phagocytophilum may cause persistent infection in ruminants, which may act as reservoir hosts for A. phagocytophilum from one grazing season to the following.

In one sheep flock, around one third of the lambs died on tick pasture, mainly due to A. phagocytophilum and secondary infections. A. phagocytophilum infection may also contribute to productivity losses on pastures with apparently no tick infestation.

The bacterium encompass multiple genetic variants, a broad host range and has pathogenic potential in several other mammalian species, including humans. Previous experimental studies have demonstrated that one ovine isolate of A. phagocytophilum causes subclinical infection in red deer, while a red deer isolate causes clinical responses in lambs. In order to investigate whether red deer and sheep belong to the same transmission cycle, we surveyed infections in both species inhabiting the same tick-habitats in southern Norway and compared the genotypes of the strains detected. The result based on genotyping of msp4 gene points out a phylogetic cluster to which wild ruminant strains appear distinct from sheep variants. Wild ruminants as a reservoir for A. phagocytophilum infections in sheep may therefore have a lower impact than previously assumed. Management of the wild cervid population for the protection of domestic livestock from ticks and tick-borne infections should therefore be further elucidated and reconsidered.
CURRENT INFECTIOUS DISEASES OF SMALL RUMINANTS IN SLOVENIA

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Introduction

Infectious, parasitic and other diseases play a crucial role in the health, well-being and production of small ruminants. The economic impact of diseases depends on the breed, management system and type of production. Producers and professionals must be aware of all these health problems and be able to prevent them on time. The purpose of this paper is to educate professionals, producers and other stakeholders on the major infectious diseases in small ruminants, which are present also in Slovenia and cause significant loses. Further strategies to prevent them will be addressed. Some of the diseases are also zoonotic and need special attention to prevent public health hazard.

Nationally important infectious diseases

Small Ruminant Lentiviruses (SRLV) are closely related retroviruses that cause Maedi Visna (MV) in sheep and Caprine arthritis encephalitis (CAE) in goats. Host genetic factors, infecting viral strain and management influence the occurrence, length and spectrum of affected target organs. Most animals remain asymptomatic, but a certain percentage of the animals develop the clinical disease in one or several target organs. Subclinical infection and disease progression may range from months to years. Both diseases have chronic character and are ultimately fatal.

Currently, the control of MV and CAE relies on the control of transmission and test and cull schemes of infected animals and their progeny.
- Maedi Visna (MV) was introduced into Slovenia through imported sheep. The name derives from two Icelandic words, which describe the main clinical signs of pneumonia and wasting. The condition is highly contagious and difficult to diagnose. In a recent survey in Slovenia more than 50% of sheep and combined sheep and goat flocks (N=15) tested positive on MV.
- Caprine Arthritis Encephalitis (CAE) primarily affects the joints and the brain, although the udder and lungs can also become infected. In a recent survey in Slovenia, nearly 28% of 967 goats tested positive for CAE. The condition is highly infectious, difficult to diagnose on clinical signs alone,
and there is no cure. The official eradication program, which will also give a disease status to flocks in Slovenia is prepared and hopefully will be adopted in near future.

Enzootic Abortion of Ewes (EAE) is one of the most common causes of abortion in sheep. Disease can spread rapidly in intensively managed systems. Once established, the infection is persistent and difficult to eradicate. EAE is also a human health hazard, which can pose a serious threat to pregnant women.

Caseous lymphadenitis has been established within Slovenia for many years. In that time the bacterial disease caused by *Corynebacterium pseudotuberculosis* and known more commonly as CLA, has spread through both the sheep and goat populations. A survey carried out in 2013 suggested that as many as 86.1% of tested small ruminant flocks (N=36) were affected. In sheep and goats the infection is characterised by the formation of abscesses within the lymph nodes and other internal organs, most notably the lungs. Whilst the majority of infected animal remains clinically healthy, most go on to develop visible external swellings. These chronic abscesses often discharge thick pus on to the skin and leave characteristic scars. There have been a number of reports of an association between the internal or visceral form of CLA and chronic wasting in affected flocks. This is an established form of the disease and the emergence of such a syndrome is a worring development that must be closely monitored. The use of commercial vaccines to control CLA is not possible, since none is yet licensed for use in Slovenia. Production of an autogenous CLA vaccine is possible. An encouraging fact in the fight against CLA is a blood test for the disease, which detects antibodies to the bacterium that causes it. It can identify infected animals before they develop the characteristic external abscesses, and is effective in finding animals with only the internal form of the disease. Such animals would otherwise carry the infection without detection and represent the greatest threat in spreading the disease from one flock to another. The ultimate aim should be total disease eradication. Another use for the test is in screening purchased animals before they are introduced to a new flock.

Johnes Disease (JD), or paratuberculosis, is an insidious fatal disease caused by *Mycobacterium avium subsp. paratuberculosis*, which causes considerable loss of stock and production in many ruminant species including small ruminants. It is present in goat and sheep flocks in Slovenia, but the prevalence is not known. It mostly affects the intestines. Infected animals that are not showing symptoms will intermittently pass the bacteria in their feces, thus spreading the disease widely. It can survive in the soil for years under moist conditions. It is usually caught by young stock from the dam or from infected surroundings. The infected animals typically shows no sign of disease for years, and then start to lose weight rapidly in spite of a good appetite, diarrhea is not necessary present and die eventually. On a flock basis, several pathology tests are useful, but individual diagnosis is more difficult. Animals that are infected but not showing signs of disease are particularly difficult to diagnose. Lambs from known or suspected infected dams should not be kept as transmission can occur in utero. In some countries it is a notifiable disease that may involve the
destruction of all stock and strict quarantine imposed on the affected farm.

Footrot is a debilitating and very painful disease of small ruminants. It is caused by the anaerobic bacterium *Dichelobacter nodosus*, an obligate parasite of the claws, in association with other ubiquitous microorganisms including *Fusobacterium necrophorum*. It causes interdigital necrosis and undermining of the claws. Sometimes it causes abscessation of the foot. The disease could be eradicated with good management. The vaccine against the disease is not licensed in Slovenia.

**Conclusion**

Producers should strive to achieve or sustain status free of these diseases, which will significantly improve overall productivity and value of their flocks. Especially as it appears that these diseases are not overwhelming so far. Professionals in the small ruminant industry should encourage and assist producers in achieving this important goal. Emphasis should be on biosecurity, which is often completely neglected by producers. Both producers and professionals should encourage policy makers to develop health plans that would officially give status of these diseases to flocks.

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Observing grazing animals can provide the livestock producer with valuable information on the quantity and quality of the forage available to the animals. Observation is perhaps the most important tool for making grazing management decisions. With a little practice, a producer can become adept at "eyeballing" the approximate amount and quality of forage being consumed by his livestock. A livestock producer must visit his pastures frequently, not only to check the animals, but also to check the forage. This allows the producer to monitor what is happening with the pasture and to anticipate and correct any potential problem before it results in reduced livestock performance (1).

Management of sheep and goats emphasizes management of the amount and quality of forage resources. These resources are influenced by climate, seasonal weather patterns, and by the plant species adapted to the local conditions. Intake can be increased by ensuring that animals have access to large amounts of forage of high digestibility. Pasture management should not be focused on measuring intake of individual animals but on optimizing animal production per unit land area. In any pasture system, internal parasite control is required because infestation leads to dramatically reduced productivity and profit (2).

Several nutritional and metabolic diseases affect sheep and goats. Most of these can be prevented or avoided by proper feeding and nutrition:

- **Urinary calculi (water belly).** The primary cause of urinary calculi is feeding concentrate diets which are excessive in phosphorus and magnesium and/or have an imbalance of calcium and phosphorus. Lack of water and water sources that are high in minerals are also contributing factors (2).

- **Trace element deficiencies.** The clinical signs associated with trace element deficiency are often insidious in onset and usually present as poorly grown lambs during late summer/early autumn. There is considerable interplay between parasitic gastroenteritis (PGE) and trace element deficiency states such that it is important for the farmer and veterinary practitioner to consider and deal with both problems. The trace element deficiency states generally considered are: cobalt, copper, and vitamin E and selenium. Cobalt has an important
biological role as a constituent of vitamin B$_{12}$ which is manufactured by micro-organisms in the first stomach (rumen). Cobalt deficiency (pine) occurs where there are low soil cobalt concentrations which may be further complicated by PGE which causes diarrhoea thereby interfering with the absorption of vitamin B$_{12}$.

Copper deficiency is common when sheep graze pastures low in copper but more often high in iron, molybdenum and sulphur. Where two or more of these three elements exist together on a farm, in quite 'normal' concentrations, they will act synergistically to bind out copper from a diet. As well as being susceptible to copper deficiency, sheep are also prone to copper accumulation and toxicity.

Selenium and vitamin E deficiency is often referred to as white muscle disease, nutritional muscular dystrophy, and stiff lamb disease. Usually seen in animals 6 to 8 weeks old, it results in poor growth, difficulty in movement, stiff legs, and possibly death. Selenium deficiency occurs in soils of certain geographic areas world-wide leading to pasture/crop deficiency. Vitamin E concentrations are high in green crops but fall rapidly under drought conditions. Certain root crops are known to be low in both selenium and vitamin E. Feeding grain treated with propionic acid may increase the risk of white muscle disease (2,3).

- Toxic or poisonous plants include those that are cyanogenetic, contain alkaloids, are photodynamic, or produce mechanical injury. Generally animals avoid such plants but during times of feed shortage or new exposure, some animals may consume poisonous plants (2).
- Ketosis (pregnancy toxaemia, lambing paralysis), a nutritional disorders, occurs at the very end of gestation and is associated with the high demand (by the fetuses) for carbohydrates (especially glucose and glucose precursors). It most often occurs in animals that are in poor condition and in animals carrying twins or triplets (2).

References

Grazing management for sheep production.


NADIS.
ECOTOXICOLOGY IN VETERINARY MEDICINE

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Introduction

Ecotoxicology is an interdisciplinary field combining toxicology – the study of the effects of chemicals and other stressors on an organism – with ecology; thereby determining the effects of a substance on the entire ecosystem. Veterinary pharmaceuticals and feed additives are of environmental concern because they can potentially be present in the environment in large amounts, either as a consequence of using manure from treated animals or deposited directly with the excreta of grazing animals.

Methods for determining the harmful effects of veterinary pharmaceuticals on terrestrial organisms and populations include standardised ecotoxicological tests (e.g. OECD, 2004; OECD, 2006; ISO, 2008; ISO, 2011 etc.) whereby animals or plants are exposed to different concentrations of the substance under study either via soil, water or food in case of animals. The endpoints measured in ecotoxicity tests include survival, growth, seed germination and seedling growth, feeding, reproduction, changes in behaviour etc. In order to extrapolate the obtained results to the entire ecosystem, assessment factors are used (EC, 2003). Their magnitude depends on the amount of data obtained with the tests, which need to be performed on as many trophic levers and life cycle stages as possible, in order to minimise the level of uncertainty.

In our work at the Laboratory of forensic toxicology and ecotoxicology of the Institute for pathology, forensic and administrative veterinary medicine at the Veterinary Faculty, University of...
Ljubljana, we focused our research on the ionophore antibiotics monensin and lasalocid. These antibiotics are given to poultry as feed additives for prevention and treatment of coccidiosis. Insufficient data were available for a reliable risk assessment, so several ecotoxicological tests were performed to ascertain their effects on soil organisms.

Methods

The following ecotoxicity tests were performed:

- Earthworm survival, growth and reproduction (OECD, 2004)
- Isopod survival, growth and food consumption (Hornung et al., 1998)
- Earthworm avoidance (ISO, 2008) and isopod avoidance (adapted from Loureiro et al., 2005)
- Earthworm and isopod metal accumulation
- Clover seedling emergence and seedling growth (OECD, 2006)

Results and discussion

The results of all the ecotoxicity tests are summarised in Table 1.

Table 1: Results of ecotoxicity tests performed with lasalocid and monensin

<table>
<thead>
<tr>
<th>Test species</th>
<th>Test compound</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Monensin</td>
<td>EC_{50} = 49.3 mg l^{-1}</td>
</tr>
<tr>
<td></td>
<td>Lasalocid</td>
<td>EC_{50} = 156 mg l^{-1}</td>
</tr>
<tr>
<td></td>
<td>Monensin</td>
<td>EC_{50} = 849 mg l^{-1}</td>
</tr>
<tr>
<td></td>
<td>Lasalocid</td>
<td>EC_{50} = 277 mg l^{-1}</td>
</tr>
<tr>
<td></td>
<td>Monensin</td>
<td>EC_{50} = 48.1 mg l^{-1}</td>
</tr>
<tr>
<td></td>
<td>Lasalocid</td>
<td>EC_{50} = 19.4 mg l^{-1}</td>
</tr>
</tbody>
</table>

Test species: *Eisenia andrei*, *Porcellio scaber*, *Trifolium pratense*.
The results have shown that the tested species show very different sensitivities to the two tested antibiotics. The most sensitive endpoint was avoidance behaviour exhibited by the woodlice (*Porcellio scaber*). This indicates that decomposers, which are a very important trophic level in the environment, could potentially avoid areas where ionophores were present, namely agricultural land. This could result in a decreased habitat function of land and a lowered production potential. Care should be taken to avoid excessive use of these antibiotics or to previously degrade them by composting the contaminated excreta.

**References**


Center za sonaravno rekultiviranje (CSR) Vremščica je bil ustanovljen l. 2000 kot samostojna enota Veterinarske fakultete Univerze v Ljubljani. Center se nahaja na kraški planoti Vremščica blizu vasi Divača. Planoto prekrivajo travniki in pašniki, ki se razprostirajo na nadmorskih višinah med 800 in 1000 m. Center obsega 386 ha površine, v katero je vključenih tudi 110 ha travnikov, kjer letno pridobijo 160 ton sena za zimsko krmljenje ovac. V CSR trenutno gojijo približno 500 ovc slovenske avtohtone pasme istrske pramenke, 15 oslov in nekaj prašičev krškopoljske pasme (ki je prav tako slovenska avtohtona pasma). Letno vzredijo v centru 550 jagnjet in proizvedejo 31.000 litrov ovčjega mleka, ki se večinoma porabi za izdelavo ovčjega sira (približno 4500 kg letno), belega sira v slanici in albuminske skute.

CSR Vremščica, ki sicer deluje kot ekološka kmetija, se uporablja kot raziskovalni in učni poligon Veterinarske fakultete. Center nudi možnosti za praktično strokovno usposabljanje študentov veterinarske medicine, praktično izobraževanje pa poteka tudi za študente biotehniške fakultete in dijake agroživilskih oziroma kmetijskih šol. CSR Vremščica kot sestavni del Mreže infrastrukturnih centrov (MRIC) Univerze v Ljubljani pa nudi svojo infrastrukturo raziskovalni dejavnosti z različnih področij veterinarskih in biotehniških ved. Center predstavlja raziskovalni poligon za različne nacionalne in mednarodne projekte, ki proučujejo možnosti ohranjanja in ponovne uporabe opuščenih kraških območij z uporabo sonaravnih tehnologij, pri čemer je še posebej poudarjena vloga avtohtonih pasem domačih živali. Raziskave so usmerjene na področja veterinarske medicine, živinoreje, gozdarstva, ekologije in ekotoksikologije, ob tem pa so proučevani tudi različni modeli za trajnostno kmetovanje. Glavni cilji raziskovalnega dela na CSR Vremščica so:

- študije interakcij živali in okolja kraških območij, poraščenih z manj kakovostno vegetacijo ali degradiranih zaradi erozije;
- spremljanje in nadzor zdravstvenega stanja živali in študije učinkov dodatkov krmi na zdravje živali in na spremembe v okolju;

PREDSTAVITEV CENTRA ZA SONARAVNO REKULTIVIRANJE VREMŠČICA

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- proučevanje fizioloških (reprodukcija, endokrinoloških, hematoloških, biokemijskih) parametrov avtohtonih domačih živali kot odraza njihove adaptacije na specifično kraško okolje.
- razvijanje ekstenzivnih sistemov sonaravnega rekultiviranja in revitalizacije kraških območij z uporabo živali kot orodja za obnovo degradiranih površin ter izboljšanje pogojev paše in vegetacijske raznolikosti;
- ureditev sistemov za nadzorovano pašo in razvoj silvo-pastoralnih sistemov rabe zemljišč v območjih omejenih dejavniki z uporabo različnih vrst avtohtonih vrst domačih živali;
- ekotoksikološke študije veterinarnih zdravil, ki vključujejo ugotavljanje njihovega izločanja, razgradnje v okolju ter toksičnosti za nekatere organizme v zemlji, ki so pomembni pri izvajanju okoljevarstvenih ocen jevovanja;
- študije možnosti sobivanja divjih in domačih živali v mejnih območjih med gozdovi in pašniki, predvsem v bližini naseljenih območij.

MICROBIOLOGICAL SAFETY OF FOOD OF ANIMAL ORIGIN IN EXTENSIVE BREEDING MILK AND MILK PRODUCTS

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Consumer concern about livestock production methodologies is increasing over the last decades due to various outbreaks of food-borne zoonozes and animal diseases. Quality assurance programmes in the different production chains have been instaled by industry to counteract the problems occurring. The primary producers, like dairy farms, are not formally comprised in such programmes. Yet, quality control at dairy farms level goes beyond the quality control of the product milk alone. For better safeguarding food safety and public health, as well as animal health and welfare the whole production proces of milk should be addressed.

Goats and sheep rank third and fourth in terms of global milk production from different species, but unlike cow milk, which has stringent hygiene and quality regulations, microbiological standards for the production and distribution of goat milk and sheep milk are more relaxed. Difficulties in managing the sanitary quality of sheep and goat milk derive from a series of factors including the low level of production per head, the milking system, the difficulty involved in machine milking, the conditions under which the herds or flocks are raised, adverse climatic conditions and the spread of production over a wide geographic area.

There are 2 primary factors that contribute to the microbiological quality of milk: the inclusion of microorganisms in excreted milk (preharvest) and the contamination of milk at the time of collection, processing, distribution and storage (postharvest). If pathogenic bacteria are among the contaminants, the product will pose a food safety threat. Most foodborne pathogens inhabit the ruminant intestinal tract, and therefore cattle, ewes and goats are considered a major reservoir of Salmonella, Campylobacter and STEC. Listeria species are widespread in nature and live naturally in plants and environments. Epidemiological studies have shown that animals probably become infected through consumption of water and feedstuffs contaminated with feces and other excretions.

Pasteurization is regarded as an effective method for eliminating foodborne pathogens and other bacteria from raw milk. However, the increasing number of reports in detection of food-borne

Pathogens in pasteurised fluid milk and ready-to-eat dairy products clearly indicates that pasteurization alone is not the final solution for the control of milk pathogens. Numerous foodborne disease outbreaks associated with cheese were reported in EU and USA in recent years. Causative factors in those cheese-related disease outbreaks were post-pasteurization contamination, faulty pasteurization equipment or procedures, and use of raw unpasteurized milk.

Several approaches have been used to minimize the possibility that milk contaminated with pathogenic organisms will reach the consumer. These include enhanced animal hygiene, improved milking hygiene, prerequisite programs, HACCP, and pasteurization.
MICROBIOLOGICAL SAFETY OF FOOD OF ANIMAL ORIGIN IN EXTENSIVE BREEDING
MEAT AND MEAT PRODUCTS

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Consumer concern about livestock production methodologies is increasing over the last decades due to various outbreaks of food-borne zoonozes and animal diseases. Quality assurance programmes in the different production chains have been instaled by industry to counteract the problems occurring. The primary producers, like extensive breeders, are not formally comprised in such programmes. For better safeguarding food safety and public health, as well as animal health and welfare the whole meat production process should be addressed.

The most serious meat safety issues affecting consumer health and triggering product recalls involve microbial, and particularly bacterial pathogens. Control of these pathogens at all stages of the "farm-to fork" chain is vital to minimise the occurrence of food-borne diseases in the human population. The source of most food-borne pathogens is farm animal that carry and shed these bacteria in the faeces. In many cases, farmed ruminants carrying zoonotic pathogens in the gastrointestinal tract show no signs of infection. Transfer of the bacteria from the hide and gut contents to the carcass can occur during hide removal and evisceration in the slaughterhouse. Most frequently reported zoonotic pathogens in foods including meats and offals are Campylobacter and Salmonella. Food-borne infections caused by Yersinia spp., Verocytotoxigenic Escherichia coli and Listeria monocytogenes had comparably lower incidences. The classical zoonozes (brucellosis, Q fever, toxoplasmosis, cryptosporidiosis) are also potential threats to human health, although the major source of contamination for these diseases remains contact with the infected animals and handling of carcasses.

Despite the numerous legal acts regulating food business operations and official controls, the traditional and ritual slaughter, especially of small ruminants, is still in practice. Traditional slaughter at homeyard in extensive farming is facing many problems as way of restraint, stunning method, bleeding, spreading of potentially infective materials into the environment, lack of ante and post-mortem inspection etc.
The application of antimicrobial interventions at farm level to reduce the levels of bacteria present at slaughter and dressing should therefore, in turn, reduce the likelihood of contamination of the meat.