



# **The 6<sup>th</sup> Circumpolar Agricultural Conference**

## **Abstract Booklet**

**Happy Valley-Goose Bay,  
Newfoundland & Labrador, Canada**

**October 1 – 3, 2007**

## BOOK OF ABSTRACTS

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### Session 1: Harvesting, Utilizing and Marketing of Northern Wildlife and Flora

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#### **Arctic Goat Husbandry - Market Potential for Goat Products**

Odd Arild Finnes

Bioforsk Norwegian Institute for Agricultural and Environmental Research

Goats are used for milk and meat production worldwide, but more in the dry warm and temperate areas of the world than in the cool regions. There is a question whether the potential for goat milk or meat production in circumpolar areas is utilized. In Northern Norway goat milk production is an important part of the agricultural business. There are about 15000 dairy goats in the region. The number of goat farmers decreases rapidly, while farm size increases, indicating substantial changes in farm structure. The causes of this negative development are politically and economically based, just as for agricultural activity in general. However, for goat farmers, these changes are more closely related to the general development of the market than in the other animal productions. The market situation for goat milk is currently changing, with a change in the pattern of consumption of goat milk in Norway. Consumers are now more inclined to cheese than to whey products (brown cheese). This calls for an improvement of overall quality and especially of flavour and cheese making properties of the milk. A project has been established to find quality measures that may be used for feeding advice and breeding for improved milk quality. A joint effort by dairy, breeding, animal nutrition and plant production scientists in collaboration with the farmers and dairies is the best way to achieve these goals. There are also several other projects and activities in the Northern part of Norway to adjust the goat milk production to future demands.

#### **Reproductive Biology of Farmed Reindeer in Alaska**

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The reproductive biology program at UAF continues to build on research reported at the last meeting. Using estrous synchronization protocols developed previously, the variable gestation length in reindeer (198 – 240 d) and the negative relationship between breeding date and gestation length has been investigated using a switchback design. In the first year, estrous was synchronized in 2 groups of reindeer for either early (n=9) or late (n=8) breeding. Despite the 28 d difference in breeding, there was a 10 d difference in mean calving date and a negative relationship between gestation length and breeding date ( $r = -0.754$ ;  $P = 0.002$ ;  $n=14$ ). The groups were switched the following year such that late bred females bred early and early bred females bred late. Variables of housing, feeding and the breeding bull remained the same. When calving is complete (spring 07) associations between gestation length and calving date,

calf sex, birth weight, dam age, and dam BW at breeding will be examined. Practical protocols for artificial insemination (AI) in Alaskan reindeer are currently being investigated. Successful AI also requires identification of desirable traits worthy of selection (e.g., rapid calf growth rate). Data on dam BW at parturition, calf birth weight and growth rate (average daily gain, ADG) and associations between reindeer milk components and calf ADG have been collected. Genetic analysis on these same reindeer will determine genotypes for milk protein loci and other loci that may affect milk properties (e.g., leptin, mtDNA) in an effort to identify genetic markers with potential for selection.

### **Awareness of Potential, Obstacles, and Tools in the Development and Marketing of Natural Health Products from the North**

Connie Kehler

Saskatchewan Herb and Spice Association

I am the executive director of a non-profit association that links agriculture and health from the forest and field to the shelf. We have been working with all levels of government? to help agriculture become a vital link in the value chain of products that relate to health from Canada. Canada has the potential and the tools to supply safe traceable products of the highest quality to this market.

Canada's north is being looked at as one of the most valuable stores of resources to feed this market. But how do we ensure that we are not just exploited, or, to the other extreme, ignored because of the negative reputation perceived of collectors of these products? How do we ensure that we keep a fair portion of the dollars and of the development in the regional communities? How do we ensure that when we do develop a program that we are meeting regulatory requirements and buyer demands to ensure the safety, quality and traceability while ensuring biodiversity? How do we ensure that we have the right plant? Our group has been actively working on these very issues with Health Canada, Agriculture Canada and Environment Canada. We have developed international practices for plant identification, we have been one of the six groups working with Health Canada on Natural Health Product Regulations and we have developed good agriculture and collections practices that work for all collectors and producers (based on HACCP principles and under the guidance of CFIA). We were also chosen by the United Nations Centre for Biodiversity to present on options for documentation for certificate of origin when we presented in front of 21 countries in January 2007.

### **Prospects of Development of Traditional Branches of Animal Breeding of Yakutia and of their Veterinary Well Being**

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In the Republic of Sakha (Yakutia) the traditional branches of animal industries are: cattle breeding, horse breeding, reindeer breeding and fur farming. Hunting is also in development. These branches are some of the occupations of aboriginals. Prospects for development of the basic branches and measures of maintenance of their veterinary well-being, provision of high quality production and health of the population are explored in this paper. The Republic of Sakha (Yakutia) is the largest agricultural region by territory and economy of the North of Russia and makes up 1/5 of all Russia. The most advanced branches are cattle breeding, horse breeding, reindeer breeding, and poultry farming. Animal breeding makes up more than 70 % of the total agricultural production. Among Northern regions of the Russian Federation, the Republic of Sakha (Yakutia) is first in the manufacture of livestock products (cattle and birds - 36,2 thousand tons, milk - 194,9 thousand tons, eggs - 112,0 million). In Central and East, Western and Southern zones of Yakutia kholmogorskyi, simmentalskyi breeds of cattle are being reared.. Beyond the polar circle herds of native Yakut cattle are raised. These possess unique adaptive abilities and provide high quality production (high fat content, marbledness of meat), though in weight and quantity of production they concede to cultural breeds. The Yakut cattle are bred as a source of a valuable genetic material and are used in selection for the improvement of adaptive abilities of kholmogorskyi and simmentalskyi cattle in the extreme conditions of the far north. Construction of average and small dairy

farms is developed for increase of efficiency of cattle breeding, on the basis of the achievements of Russian and foreign animal breeding. Delivery of highly productive heifers from Austria, Canada and the central areas of Russia is planned. Also, with the object of restoration of biodiversity, attempts are being undertaken for delivery and duplication of musk oxen, Canadian bison, and yaks. Horse breeding istaboon – the traditional occupation of the sakha people. In extreme conditions of Yakutia the Yakut breed of horses is being reared by a method of national selection. The basic objective of promoting this breed is for meat, because horse meat possesses high flavour quality and contains many biologically active substances. One of the prospects for development of horse breeding is the development of remote sites and rational use of pasturable farming lands. In northern territories of Yakutia reindeer breeding is advanced, as evidenced by three breeds: Evenkiyi, Evenskiyi and Chukchyi. With the objective of further development of this branch, a program is being developed which provides maintenance of functioning of reindeer breeding as a traditional way of life, culture and the spiritual development of small populations of the North. Agro industrial manufacture. Non-domestic trade animals in regions of the Far North have essential value in maintenance of the population with the specific food stuffs necessary in extreme natural-climatic conditions, and also in development of biologically active medical products and additives. Preservation, increase of livestock and reception of high quality products substantially depend on the veterinary well-being of ungulate fauna. Among ungulate animals of Arctic regions are registered zoonotic illnesses: the Siberian ulcer, furiousness and brucellosis. The greatest danger is represented by the old centres of infections of Siberian ulcer which are located almost everywhere in the North of Russia. An unresolved problem today is brucellosis in reindeer (wild and domestic). Scientists at the Yakut Scientific Research Institute of Agriculture offer methods of specific preventive by using various vaccines. The natural focus of infection complicates the effectual measures of struggle. Necrobacteriosis of deer annually causes major damage, especially to domestic reindeer breeding. In spite of specific measures and medical actions, distribution of the Arctic variant of furiousness - "savage" is caused by the existence of the natural focus of infection among polar fox and dogs. Therefore the opportunity for distribution of an infection remains real. Hypodermic botflies do significant damage to reindeer breeding. Scientists have investigated the biology of botflies and have developed methods of resistance through insecticides and repellents. It is necessary to note that parasitic illnesses of deer, horses and wild ungulate animals remain unresolved problems, though the biology and distribution of the basic helminthiasis have been investigated. Another unresolved problem remaining is bronco-pneumonia in the young growth of deer, epizootic death which sometimes reaches 30 %. Last year we established the circulation of the infectious viruses rhinotracheitis and diarrhea in some areas of Yakutia in which occurrence, probably, birds of passage have a role. Stable development of horse breeding in the Arctic regions is impaired by infectious diseases: strangles, salmonellosis abortion, rhinopneumonia and leptospirosis. Scientists at the Yakut Scientific Research Institute of Agriculture for the first time can offer vaccines against strangles and salmonellosis abortion. The new inactivated vaccine against virus abortion rhinopneumonitis is being developed. New medical products have been registered in the Russian Federation, including a new probiotic called "Sakhabactisubtil" which is being successfully used for preventive treatment of dysbacterioses, endometrisis, mycotoxicosis, and also as an immunomodulating component of vaccines with the fermental structure of mineral-vitamin additives. With a view to preventive maintenance of respiratory illnesses of deer, we offer antibacterial preparations and immunomodulators on a basis of probiotic means. Recipes for mineral-vitamin additives for deer, horses, and large-horned livestock in view of the geochemical features of various regions are being developed. Technologies for processing of products of reindeer breeding and horse breeding (unossified horns of marals, blood, milk, endocrine organs, meat, and offal) for the food-processing industry and the manufacture of biologically active additives and medical products are also being developed. . Biologically active additives and the medical products developed for animals and humans should have a natural origin without the addition of genetic-modified connections and pathogenic strains of microorganisms. Research immunomodulators of a natural origin and their application with the account of their immunobiological features of an organism will increase the efficiency of preventive and medical actions.

### **The Features of Reindeer-breeding in Northern Regions of the Russian Federation**

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Reindeer-breeding forms the basic direction of agriculture in northern regions of the Russian Federation. The structure of herds and features of veterinary actions depend on the specificity of the conducting branch, natural-climatic conditions and the character of economic activities.

The basic structure of the herd in pasturing reindeer-breeding is made up of castrated bulls that use it as a vehicle for moving long distances at pasturage or driving. The foetus portion makes up about one fourth of the herd: female deer and male deer which are intended for the reproduction of the herd.

Young animals of different ages account for an insignificant part of the general livestock.

The structure of the herd and its sex-age composition are a basis for realization of preventive and medical veterinary actions. The anti-epizootic work is directed at the preventive maintenance of infectious and parasitic illnesses. All processing takes place in the spring-and-summer period. This time period is important in pasturing reindeer-breeding as it is necessary not only to keep up the herds but to increase the viable condition and ability of animals to move on long routes to pasturages. It allows not only the prevention of illness but also high quality production.

### **Arctic Lamb Meat – Can / Do Northern Products Have Special Qualities?**

Espen Haugland, Vibeke Lind, Marit Jørgensen, Margrethe Hersleth, Jørgen Mølmann, Ingrid Roaldsen and Odd-Jarl Borch

Norwegian lamb meat production is mostly based on local resources such as natural pastures in forest and mountain areas. High production costs and geography sets limitations for Norwegian farmers to compete on prices in an international market for products in volume. Products of high quality are therefore one strategy to meet international competition. This project is expected to identify how northern and alpine climates influence forage quality of pasture plants, and whether this influences lamb meat quality, and how such a quality can be used when marketing the product nationally and internationally. We will study the quality of selected pasture species at various locations under field conditions. Under controlled conditions we will investigate effects of temperature and day length on forage quality and other biochemical compounds important in determining meat quality, such as fatty acids. Meat quality of lambs grazing in contrasting areas (coastal-subarctic and dry-mountainous) will be compared. The effect of finishing the lambs on different infield pastures on meat quality, as opposed to slaughtering directly from the mountain pasture, will also be addressed. Both sensory characteristics and other quality aspects such as food traditions and region of origin will be studied with regards to consumer acceptance in a national and an international market. The possibility of promoting Norwegian lamb meat in Italy will be explored and different competition strategies evaluated.

### **The Maintenance of Epizootic Prosperity of Brucellosis in Northern Reindeer-breeding in the Russian Federation**

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The most numerous population of a world reindeer livestock lives in the territory of the Russian Federation. The wild fauna of regions of the Far North is a source of pathogens of dangerous infections in the natural centers. Brucellosis occupies a leading place among an infectious pathology of reindeer in climatic conditions of the Polar region. Apart from economic damage, brucellosis represents a health hazard to people, especially reindeer-breeders and members of their families, veterinary experts and workers in the processing industry. Therefore the maintenance of epizootic prosperity is a paramount problem of the veterinary experts working in northern reindeer-breeding. The scientific and practical veterinaries have created systems of preventive and curative action towards reindeer brucellosis in

threatened territories. The practical use of an anti-epizootic system with the application of vaccines in the natural brucellosis centers has achieved positive results over the last 20 years (1984-2004). There are no registered cases with clinical manifestations of brucellosis infections in herds, there has been a decrease in the number of positively reacting animals, and the vaccine has increased birth rate and the viability of calves. The analysis has shown that these measures as a whole have appreciably increased the parameters of profitability of branch to conduction brucellosis measures in recent years.

### **Wildlife Diseases of Concern to Labrador**

Dr. Hugh Whitney  
Animal Health Division  
Department of Natural Resources

The wildlife of Labrador harbour many diseases of concern to both the animal species themselves as well as to humans who interact with them. Most of these diseases have not been adequately studied. Diseases of current concern include rabies in foxes, dogs and wolves; unilocular hydatidosis in moose and caribou; multilocular hydatidosis in small rodents; trichinosis in a variety of species; as well as toxoplasmosis and anisakidosis. The presentation will identify current knowledge as well as plans on future research or surveillance activities.

### **Losses of Sheep and Reindeer on Pastures in Norway: Information, Advice and Present and Future Research and Development**

Ronald Bjøru and Inger Hansen (Bioforsk)

In summer, more than 2.1 million sheep and lamb graze in Norwegian outfield and mountain ranges. Up to the 1990's, the losses of sheep and lambs were stable, with an annual loss of approx. 3,6 %, mainly due to accidents, illnesses and carnivores. The numbers of large carnivores (wolf, bear, lynx and wolverine) and the golden eagle have increased over the last 15-20 years, due to international agreements and a political will in Norway to have sustainable populations of these species. At the same time, the annual losses of sheep and lambs have increased to a peak last year (2006) of 6,8 %. Reindeer have had the same development regarding increased depredation. This paper deals with present and future R&D in causes of loss and preventive measures, and information and advice to farmers and authorities on methods of preventing depredation. The main goal is to reduce the losses of sheep and reindeer, and at the same time reach the government's goals for sustainable population of carnivores. In 2006, Bioforsk launched a website which summarized the knowledge of causes of losses and preventive methods on depredation, based on an agricultural approach and Bioforsk's competence in animal welfare, grazing and livestock management.

### **The Efficiency of Performance of Anti-epizootic Actions in Northern Reindeer-breeding Russia**

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The increase of profitability of northern reindeer-breeding is a paramount problem of the branch. One of the important factors in economic damage in reindeer breeding is infections. The Siberian ulcer and necrobacteriosis are among the most dangerous infectious diseases in the natural habitat of reindeer of the Russian North. Natural climatic and geographical conditions of the Far North are the important factors in the epizootic processes of the given infections. It is necessary to take into account the fact that the period of preservation of viability of the pathogen in an environment is reduced by at least 10 times in the conditions of the Far North, in comparison with territories of middle and southern latitudes in terms of specific preventive maintenance of the Siberian ulcer. This period of preservation is the basis for the change of technology in preventive maintenance and the reduction of additional material costs. The

pathogenesis and mechanism of diseases communicated by necrobacteriosis-carrying reindeer in a seasonal way has been insufficiently investigated.. It has been established as the leading cause in diseases of limbs belongs to microbic associations. It requires thorough study of the process and development of new means for preventive maintenance and therapy for the given pathology. The usual situation creates a necessity for the perfection of epizootic monitoring and a system of preventive actions, the use of modern equipment, and new technologies in the realization of veterinary actions and development of fundamental scientific directions in the field of microbiology and veterinary medicine.

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## Session 2: Adopting Emerging Technologies in Northern Agriculture

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### Sub-Arctic N Fixation

Matthew Ball & Tony Hill  
Agriculture Branch  
Department of Energy, Mines and Resources

A series of experiments was carried out during the 2005 and 2006 field seasons designed to examine the dry matter yield, nitrogen yield and nitrogen fixation of monoculture alfalfa and binary mixed alfalfa brome grass or timothy forage swards in subarctic conditions. A combination of the low fertilizer rate with the TagTeam or N-Prove inoculants (from Philom Bios) provided the highest alfalfa yields in most circumstances. In the brome grass stands, both at the cooperator site and the Yukon Government Research Farm, the alfalfa showed poor results with low nitrogen yields (ranging from 1 - 13 kg/ha) in the establishment year and a maximum of 22 kg/ha in the 2nd year's growth. As discussed in previous reports and shown again in this data, brome grass is not a good companion crop in a forage sward with alfalfa.

Within the timothy stand, where the grass is less competitive, the alfalfa production reached almost 1400 kg/ha in the 2005 establishment year, providing over 50% of the sward nitrogen. In the second year stand, the nitrogen yield reached over 100 kg/ha, resulting in a contribution of 90% and a nitrogen fixation rate of 90 kg/ha. In the monoculture alfalfa stand the effect of inoculation was compromised by nodulation in all plots midway through the 2005 season. Dry matter yields exceeded 3000 kg/ha in both years. Nitrogen fixation rates were computed using a timothy reference crop. The nitrogen fixation in the establishment year was 65 - 77 kg/ha and in the second year 50 - 65 kg/ha. The effect of late season harvest was to reduce the nitrogen fixation by upwards of 66%.

### Preservatives and Machines with Knives Improve the Silage Quality in Round Bales

Eriksson, Harry, SLU,  
Department of Agricultural Research for Northern Sweden

In a dairy extension project aiming at improved silage quality, more than 1100 silage samples from the harvests 2001 -2006 have been tested. Almost 600 farmers have contributed with silage samples. The deal was that the farmer should get a free analyse if an information sheet with details about the harvesting and storing technique accompanied the silage samples. The collected data shows that 45 % of the silage samples came from round bales, most of them wrapped with plastic but also some put in plastic bags. Signs of spore forming clostridia bacteria, which can damage the cheese quality as butyric acid were found in 45 % of the samples from machines without knives and without use of preservatives. In silage from machines with knives but without use of preservatives the frequency of clostridia fermentation was reduced by 1/3. In silage from machines with knives and use of preservatives the frequency of butyric acid was reduced by another 1/3. We also found increasing frequencies of butyric acid with increasing time between baling and wrapping with plastic, especially if no preservatives were used, and increasing clover content and with decreasing d.m.. Butyric acid was often accompanied with increased content of ADIC, indicating heating processes before anaerobic conditions had been established.

### Windbreaks and Snow-trapping Techniques have Potential as Management Practices in Cloudberry Production

S. Kristine Naess  
Centre de Recherche Les Buissons

The cloudberry, *Rubus chamaemorus*, is a small herbaceous bramble species inhabiting peatlands of the northern hemisphere. The golden fruit, with its unique musky aroma, has been cherished throughout history in Scandinavia and is increasing in popularity in Canada. Both in Scandinavia and in Canada, the



demand for this small fruit outpaces supply due to low yields and yield instability in the wild. In the pilot study described here, both windbreaks and snow-trapping techniques have shown potential as management practices useful in stabilizing cloudberry yields. Experimental enclosures, designed to exaggerate the effects on micro-climate, led to increased snow accumulation, decreased wind strength, and increased air and soil temperatures. Both windbreaks and snow-trapping techniques had significant effects on cloudberry flowering phenology and senescence, as well as on flower numbers and fruit set. There were significant interactions between the 2005 and 2006 seasons and the effects of the various treatments. While snow trapping significantly delayed flowering in 2005 at all eight study sites, no significant delays in flowering were observed at four sites in 2006. Nonetheless, flower numbers and fruit set were superior in 2006 in the snow fenced plots. Windbreaks had no significant effects on flowering phenology at any of the sites in 2005 but led to slightly advanced flowering at one site in 2006.

### **Creating Young Prairie Land from Metalliferous Mill Tailings (Iron) in Labrador West: Successes, Experiences, Challenges and Future Opportunities**

Normand Cossette P. Eng. & Agr.  
Irrigation NORCO Inc.

This paper will discuss the various methods used since 1996 to achieve the revegetation of metalliferous mill tailings in Labrador West, keeping in mind that the main objective is to transform a sterile medium of growth (tailings) into a living soil, the outcome being a young, self sustaining prairie land, which is satisfactory both in regard to legislation requirements and common sense. A review is provided of the natural vegetation successions in boreal, northern hemisphere climates and the approximate number of years necessary in theory. Suggested agro-environmental engineering methodology is: appreciation of on-site conditions and obstacles (e.g. wind erosion), botanical survey, soil survey, historical climate data, topological survey/aerial photograph, first season-of-growth design guidelines, continuous improvement (learning curve).

Successes and experiences since 1996: avoidance of topsoil capping approach, irrigation, spreading hay as a mulching material, use of vascular plants and non-vascular plants, pioneering plant species, and speeding up the natural process tenfold .

Also discussed will be necessary equipment, choice of fertilizers, seed mix(es) and shelter crop, agronomical and meteorological follow-up, and the normal need for re-fertilization. We will conclude with the living soil obtained and its impacts on environment (flora & fauna), potential agricultural activities, and challenges and future opportunities.

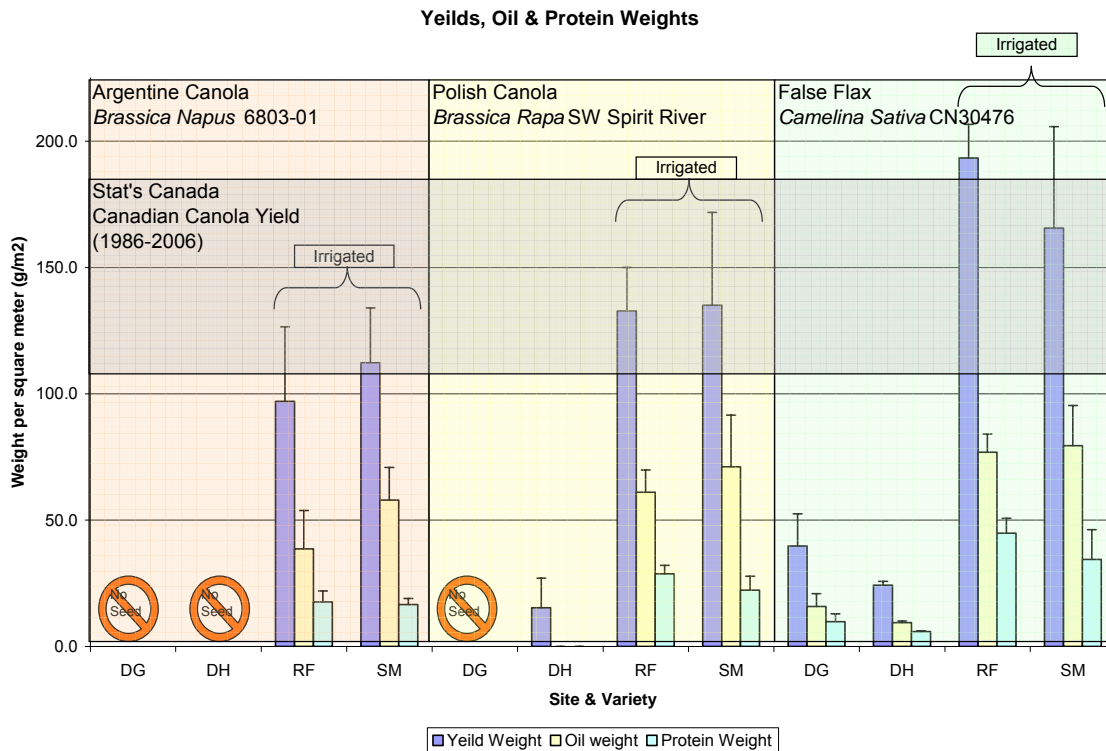
### **Oilseeds for BioDiesel North of 60° Summary**

Matthew Ball  
Agrologist  
Yukon Government

In December 2006 the Federal Government announced action on the Renewable Fuel Standard to require ethanol and biodiesel blended fuel in Canada. The regulation is to require 5% renewable content in gasoline by 2010 and a 2% renewable content in diesel and home heating fuel by no later than 2012. Also announced was a capital grant program to encourage farmer participation. Earlier in 2006 the Agriculture Branch, in co-operation with the Energy Solutions Centre and Yukon producers, set out to determine the viability of oilseeds for biodiesel in the Yukon. For year one of a four-year Oilseeds project, four varieties of oilseeds were tested which included two Canola varieties, a false flax, and a true flax. It should be mentioned that for this project **no** GMO varieties were or will be tested. Short season Polish Canola (*Brassica Rapa*) was evaluated against a longer season Argentine Canola (*Brassica Napus*), a long season Flanders Flax (*Linum Usitatissimum*), and a False Flax (also know as gold-of-pleasure) (*Camelina Sativa*). The Canolas were evaluated because they are a high oil-producing crop suited to cooler climates vs some of the other warmer climate oil seeds such as Soya. The Flanders Flax was included in this project because of its health properties as an oil seed. The False Flax was a

recommendation by Plant Pathologist Richard Gugel, M.Sc. of Agriculture and Agri-Food Canada, because it is a short season low input crop and therefore may be more suited to the Yukon. Experiment plots were set up around the Whitehorse Area, and one in the Central Yukon. These sites were set up to evaluate each variety in small, 2x2 m, plots with four plots per variety. The plots were set up in completely random design on irrigated and dry land sites. The results for the first year were very encouraging, although not without some hardship. The Central Yukon site was lost, most likely to a very evasive and hungry ground critter. From the 4 sites set up in the Whitehorse area, results varied from the dryland vs irrigated sites and also differences were observed between the varieties.

The following chart shows the average yields of the four samples taken from each variety at each site, with the exclusion of the Flanders Flax. The Flanders Flax never matured, no seeds were harvested at any of the test sites. Site output summary for 2006 Oilseeds evaluation



Looking at the oilseeds results above, the irrigated sites performed much better than the dryland sites. The dryland sites had no, to minimal yields for Rapa Canola, and low yields for the False Flax. For the irrigated sites, much better results were observed, with the best yields being observed in the False Flax as shown in the chart 1. Comparison of the Canola varieties found the early maturing Polish Canola performing better than the Argentine Canola. Statistics Canada reports Total Canadian Canola Yields from 1986 to 2006 as 110 to 180 g/. Using this as a target would suggest that the oilseeds production for the Rapa falls into the average yields and the Napus was on the lower end and below the average. It should be noted that the Statistics Canada results are low because of individual growers who, with the same soil and climate limitations as their neighbors, consistently achieve much higher yields in the range of 220 to 280 g/m<sup>2</sup> range.

When comparing oil content between the varieties the Canola had a higher percentage of oil, yet the total output of oil per square meter was still lower to the higher yielding False Flax. The oil output per square meter at the irrigated sites averaged:

- False Flax 78.2 g/m<sup>2</sup>
- Rapa 66.1 g/m<sup>2</sup>
- Napus 48.3 g/m<sup>2</sup>

The protein content of the oilseeds was reported to determine the value of the meal portion of the crop. The false flax again had the highest protein content on a weight and percentage bases, therefore the meal portion would have high protein content, but it is unknown if the meal is a suitable feed. Canola meal is currently used by farm animals as a supplemental feed.

2006 Agroclimatic data (Oilseeds site comparison):

Site	Irrigated Sites		Dryland Sites		Crop lost Central Yukon
	RF	SM	DH	DG	
Effective Growing Degree Days (EGDD)	926	1020	866	884***	1191
Land Capability Class	Class 4	Class 4	Class 5	Class 4-5***	Class 3
Frost Free Days	33	43	35	35***	84
Fall Killing Frost	Sept-01	Sept-05	Sept-10	Sept-9-10***	Sept-13

\*\*\*No data agroclimatic data available for this site. Data reported based on average data for Takhini Valley.

Evaluation of the climate data showed better growing conditions at the RF and SM sites as defined by the higher EGDD. The SM site had the best EGDD and the yield results indicate that there is slight improvement in yields for the Canola but not with the Camelina Sativa. There is more information supporting the need for irrigation, although the land classification and short amount of frost free days, indicate that the climate is a limiting factor to oilseeds. It is expected that the Carmacks area would result in better yields based on climate data but further study is required to prove this.

Key points:

- It's been proven that oilseeds can be grown in the Yukon
- Yields are low when compared to yields in the 220 to 280 g/m<sup>2</sup> grown in other areas of Canada
- Irrigation is a necessity, dryland sites showed limited crop potential
- A location further north is required to understand the potential of the warmer central Yukon climate.
- Shorter season varieties performed better than the longer season varieties. Discussion is required to determine if a one-year evaluation can be used to exclude the longer season varieties, and expand the research only on shorter season varieties.

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## **Session 3: Supporting Agricultural Growth through Rural Development**

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### **Dr. Rob Greenwood**

Director, Leslie Harris Centre of Regional Policy and Development  
Rural and Regional Development Around the North Atlantic Rim:  
Opportunities for Collaboration

Rural and Regional Development requires an integrated approach involving local organizations working in concert with regional and national authorities. Building capacity at the local level is essential if development is to be sustainable – you cannot “do” development “to” people. Development strategies must also be created that are informed by the best possible information and that realistically assess the resources required for implementation. Northern regions face particular changes in rural and regional development. All too often they have looked to their national centres of decision-making for models and approaches, which are often developed for conditions that are very different from northern requirements. By partnering with similar regions around the North Atlantic Rim, and elsewhere, lessons can be shared and linkages established which will contribute to more appropriate strategies and processes for long-term rural and regional development.

### **Supporting Agriculture Growth Through Rural Development Initiatives in Circumpolar Regions**

Nikolay Mikhailov

Director, Magadan NE Agricultural Research Institute  
Member, Russian Academy of Agricultural Sciences  
Russia

Further exploration of the natural resources of circumpolar regions, including the North Far East of Russia, is necessary to restore and develop the economy. This has not only economic value; consolidation of native populations and the involvement of a new stream of migrants from central parts of Russia working in the agricultural industry has geopolitical value that impacts the stability of the geopolitical status of northern territories of the country. Gradual changes from decreasing production to agricultural growth in all Far East regions are taking place. Nevertheless, completeness of nutrition in the North East of Russia (Magadan and Kamchatsk regions, Chukotka, North of Sakhalin and Khabarovsk) does not correspond to the index of demand. There exists a reduction of head of livestock and poultry and milk and egg production. It is important to develop local agriculture and milk and egg production because foodstuffs from central parts of Russia are not of great nutritional value. Provision of milk and dairy products from local farms has special meaning. Successful development of milk livestock depends on the availability of obligatory forage reserve that consists of imported concentrated grain crops as well as local annual grass crops. Specialists at the Magadan Agricultural Research Institute have devised a technology of dairy production in specific climate conditions of North Russia.

### **The Role of the Labrador Lake Melville Association in the Development of Agriculture in Central Labrador**

Lake Melville Agricultural Association

The Lake Melville Agricultural Association grew out of the Lake Melville Agricultural Society which had existed in the Central Labrador region with sporadic activity and membership for about 20 years. During 1999, with the support of the Central Labrador Economic Development Board, the Association was incorporated. The incorporation was undertaken to enable the Association to hold possession of equipment and land and to enable it to take a proactive approach to the development of agriculture in the region. In 2001 the Association undertook a Planning process and drafted the "Long Range Plan for Food and Feed Self-sufficiency for Central Labrador". The Association has initiated projects, acquired

equipment, participated in the activities of the Newfoundland and Labrador Federation of Agriculture, and generally supported agricultural development in the region.

### **The Dynamics of Local Food Systems in a Northern Boreal Context in the 21<sup>st</sup> Century**

Dr. Mehdi Zahaf

Faculty of Business Administration

Dr. Connie Nelson,

School of Social Work and Master of Public Health

“Think globally, act locally”; this motto has driven since 1979 most of our strategic economic development policies. When David Brower came up with that concept, the world population was facing other problems different in nature, scope and complexity than what we are facing nowadays. In fact, with 14.7% of the Canadian population experiencing food insecurity in 2005, the food security equilibrium is now at serious risk. Add to that the fuss about a carbohydrate based economy and you get the challenging picture of further threats to food supplies. Our aim here is not to reinvent the wheel; rather, we want to propose a sustainable framework for developing an efficient food security system for local communities in the Northwestern Ontario boreal region. Our vision is driven by a dynamic and integrative perspective that is based on a contextual fluidity model. Basically, this approach supports a unique type of cooperation between community partners, the agricultural community, and the consumers. Two community-driven projects have been designed and are now implemented, i.e., beef production project and wheat milling project. Even though these are two different sectors of activity, the problems faced by farmers are similar: high costs of distribution, gap between the local supply and the local demand, and lack of northern based infrastructure to address the problem. Hence, the physiology of the proposed system is summarized as follows: (i) community-based markets present a distinct configuration from conventional markets at different levels, (ii) solutions could be based on micro projects that help raise awareness among the population on potential benefit of consuming locally, and (iii) “the buy local” argument finds here a legitimate use.

### **The Contribution of Parks and Protected Areas to the Conservation of Domestic Animal Diversity**

Julie Rosenthal

PhD Candidate, Lakehead University

Faculty of Forestry and the Forest Environment

The United Nations Food and Agriculture Organization (FAO) estimates that in the past 15 years 300 of the world’s documented livestock breeds have become extinct. Conservative estimates suggest that 25% of the remaining 4500 documented breeds are at risk of extinction. Of particular concern is the survival of autochthonous breeds, uniquely adapted to the landscapes in which they evolved. These breeds are increasingly abandoned in favour of more productive, exotic breeds. Where parks and protected areas overlap with landscapes utilized by people engaged in traditional agricultural and/or pastoral practices, a potential exists for protected areas to contribute to the conservation of live populations of local domestic animal diversity. Parks and protected areas can provide incentives for the uses of indigenous breeds through their use for vegetation management, through sustainable development projects that encourage value-added production of food or fibre products, or by supporting the use of local breeds and/or their food products and fibre as tourism attractions. The purpose of this study is to determine the extent to which parks and protected areas are acknowledged by national bodies as a means of conserving domestic animal diversity by reviewing reports submitted by 139 countries worldwide for FAO’s first report on the State of the World’s Animal Genetic Resources. Protected areas in northern Europe are presented as case studies to provide examples of the ways in which parks and protected areas can contribute to the conservation of indigenous breeds of livestock.

### **Co-action Between Farmers, Researchers and Agricultural Authorities to Ensure Rural Development**

Bjørn Mathisen, Chair

The North Norwegian Agricultural Council

The North Norwegian Agricultural Council (NNAC) represents the following organisations: The North Norwegian farmers organisations; Norwegian Farmers' and Smallholders' Union and Norwegian Farmers' Union (Norges Bondelag), TINE BA (the sales and marketing organization for Norway's dairy cooperative), the Norwegian Agricultural Purchasing and Marketing Cooperation (FK) and Nortura BA (the sales and marketing organisation for Norway's meat cooperative). NNAC have established a process named the Research and Development in Arctic Agriculture and Land Use, in which NNAC, research institutions, universities and agricultural authorities cooperate to ensure establishment of new knowledge with the intention of creating a more sustainable agricultural industry and vital agricultural communities in northern parts of Norway. In the process different ideas are discussed in groups with wide representations. The various ideas are then given priority for development of research projects. The project planning groups which contributed to the development and design of the project have representatives from local businesses, agricultural industry, county governors, the agricultural advisory services, universities and research institutes. The cooperation has been successful, resulting in establishment of new projects, new knowledge and an enthusiastic focus on rural development in Northern Norway.

### **Cool Climate Corn Production: Challenges and Opportunities in Newfoundland**

Allan Kwabiah

Atlantic Cool Climate Research Center

At the turn of the millennium, the Newfoundland dairy industry was granted 33 ML industrial milk quota with a phase in period of 13 years. The new quota came as an addition to the existing 33 ML market (fresh) milk quota. With this, the industry was faced with several challenges including how to improve profitability by replacing costly imported livestock feeds with cheaper owner-produced high quality feed. Over the past 6-7 years our research has established that biodegradable plastic mulch could be effective as a ground cover for increasing the temperature of cold spring soils and accelerating seedling emergence and growth of corn (*Zea mays* L.). Our knowledge and resources have contributed to giving the farmers added confidence in silage as well as sweet corn production, resulting in the unprecedented generation of higher and more reliable milk yields and profitable production of fresh market sweet corn. Today over 50 farmers are cultivating a total of 959 ha of corn with biodegradable plastic mulch, compared with a single farmer who cultivated 5 ha in a research study in the summer of 2000.

### **Northwest Territories Native Seed Development Project**

Pippa Seccombe-Hett

Manager, Technology Development

Aurora Research Institute

The Aurora Research Institute initiated a project in 2006 to develop seed sources from native plant species in the Northwest Territories. This project has been designed in order to develop technologies to propagate and cultivate native plant species. The main deliverable will ultimately provide a system whereby these species will become available for commercial production and the seed can be used in revegetation and reclamation in the Northwest Territories. The need for native plant seed for reclamation and restoration purposes has been identified because of increased industrial development in the territory and the need to improve land reclamation practices and environmental mitigation strategies. This project involves a number of partnerships with organizations from across the Northwest Territories and Alberta. During the summer of 2006, over 250 seed collections were made from 45 plant species native to the Northwest Territories. The majority of the species targeted included grasses, forbs and legumes and were selected based on species growth characteristics, literature reviews, consultation with northern

reclamation specialists and field observations on pre-existing disturbances. These collections are currently being evaluated through germination, field and growth trials.

### **Growing Silage Corn in Cool Climates**

Sabrina Brock

Department of Natural Resources

Silage corn production in Newfoundland and Labrador has been an on-going challenge due mainly to harsh climate, rugged landscape and lack of arable land for farming practices. This has caused Newfoundland and Labrador's livestock and forage producers to become very independent and find new and emerging opportunities to take advantage of their limited land bases and adverse growing conditions, in order to achieve the highest yields of good quality forage and feeds as possible. In striving to keep feed costs down and achieve optimal yields from their limited land bases, the Province's producers began growing silage corn about 15 years ago. The first field of silage corn in Newfoundland and Labrador was a 20 hectare (50 acre) field on the West Coast. Since that time silage corn production has spread to all areas of the Province, with current production levels of 750 hectares (1,800 acres), and approximately 75% of this silage corn is grown under Samco X-tend plastic mulch. Using photo and biodegradable plastic mulching, the Samco X-tend technology, which originated in Ireland, has enabled producers to increase Crop Heat Units (CHU) by an astonishing 300 CHU, therefore enabling them to bring varieties which were once out of their reach, to maturity. From research done in past years it has been found that the Samco X-tend system not only increases heat unit availability but also has the ability to increase dry matter yields by 33% over conventionally sown corn (S. Morris, 2004).

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## Session 4: Northern Agriculture – Evolving with a Changing World

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### **Building and Managing Nontraditional Freestall Dairy Buildings in Northern Norway: Results from One Pilot Farm**

Svein Morten Eilertsen<sup>1</sup> & Ola Johansen<sup>2</sup>

- 1) Farmer and senior researcher, Norwegian Institute for Agricultural and Environmental Research, Arctic Agriculture and Land Use Division, N-8860 Tjøtta, Norway
- 2) Office of the Finnmark County Governor, Department of Agriculture, Statens Hus, N-9800 Vadso, Norway.

A project called “Landbruksbygg i Arktis” is being developed between the Department of Agriculture in the County Governor of Finnmark, Troms and Nordland, and the Department of Agricultural Engineering at the Agricultural University of Norway. The project is related to the challenge of farming more cost-effectively and at the same time coping with better animal welfare and health. The main objective in this project is to design /construct an improved building to increase profit in dairy farming. Seventeen voluntary farmers in the arctic area who want to build new buildings for milk-production are partners in the project. These pilot buildings are created in an integrated process between the farmer, building planners and researchers on animal welfare. The focus in this development-process is human and animal welfare combined with low investment cost. One of these pilot buildings is located at Straumbygda in Nordland County. The farm was a traditional Norwegian one with milk production of average size (milk production above 100.000 l/year). The new building is based on the farm’s own resources such as spruce forest, sawmill and own work capacity. After a building period of approximately 3 years and 4.554 hours of work, the dairy barn was finished at a total cost of 1.220.000 NOK (213.000 USD). The original building cost was estimated at 2.941.000 NOK (513.000 USD). Therefore, based on the farm’s own resources and the farmer’s own work, the building cost was reduced by approximately 60%.

### **Welfare of Dairy cows and Calves in Cold Buildings in Northern Norway**

Inger Hansen

Bioforsk, Arctic Agriculture and Land Use Division  
N-8860 Tjøtta , Norway

Welfare studies performed through the project “Landbruksbygg i Arktis” (free stall, cold-housing for dairy cows in the Arctic) generally show that dairy cow welfare, health and milk production are good, although the temperature indoors might be far below zero degrees Celsius. However, both dairy cows and calves react to cold climate by lying down significantly less and standing more of the time. Reduced lying time indicates that the bedding materials used were not optimal regarding good lying comfort. If calves younger than four weeks are to be housed in cold buildings, it is necessary to offer them a partly insulated lying area. Older calves should have bedding materials with low heat conductance (good insulation capacity). In cold, as well as in warm buildings for milk production, it is the farmer who is the most important factor ensuring animal welfare. Good calf management, based on good routines for colostrum feeding and a dry and draught-proof environment, is essential in order to obtain high quality calf welfare. There are additional challenges regarding cold-housing of animals due to wind and weather that suddenly may change the indoor climate. Hence, extra responsibility is put upon the farmers and their management of cold buildings.



### **Sharing Northern Agriculture Knowledge**

Sheila Downer, Executive Director,  
SmartLabrador Inc

In this changing world, having access to pertinent information and expertise is critical to economic success. Harnessing information and knowledge assets of the northern agriculture community can play a pivotal role in building a diverse and vibrant northern agricultural sector. SmartLabrador has a history of success in its work in northern communities for the development of networks and online applications. Leading the development of the Northern Knowledge Network, SmartLabrador is working with global partners to:

- Improve communications across northern communities
- Improve sharing of information and development of partnership initiatives
- Improve linkages between scientific and traditional knowledge

This presentation will introduce the Northern Knowledge Network as a potential tool for building an online Northern agricultural community. Topics will include the approach SmartLabrador is proposing for the Northern Knowledge Network, the value of linking members of the agricultural community across the circumpolar region and the potential innovative partnerships that can be derived from this type of initiative.

### **Conservation Status – Creating New Possibilities or New Limitations on Farming?**

Gunn Elin Fedreheim Nordland Research Institute  
Ronald Bjørn (Bioforsk)

Being a farmer in Northern Norway is challenging in many ways. In the last 20 years a greater attention has been given to area conservation, also influencing the farmer in many ways. In order to reach IUCN's goal of conserving 15 % of the land area in Norway, it is necessary to also conserve private property as national parks. Increasing the conservation of outfields affects property owners in many ways; the conservation regulations define which initiatives can be taken in an area, the use of the area for forestry might be regulated, the national park status might attract even more people. All of these factors are mentioned as considerations regarding area conservation in Norway. In this paper we will present some preliminary results from the project Protected Areas as Resources for Coastal and Rural Business Development (PROBUS). The research question in this paper will be the following: *How can farmers continue their activities or create new activities in conserved areas in Northern Norway?* Some of the themes addressed will then be the different incentives relevant for farming in conserved areas, formal regulations that regulate farming in conserved areas, the possibilities for supplementary activities related to tourism and outdoor activities, and the interplay between the possibilities and the limitations with farming in conserved areas.

### **New/Emerging Pests in Alaska: Will Climate Change Favor Insect Expansion into Alaska?**

Alberto Pantoja, Aaron Hagerty, and Susan Emmert  
United States Department of Agriculture  
Agricultural Research Service  
Subarctic Agricultural Research Unit

Because of its geographical isolation and climatic constraints, Alaska agriculture is considered relatively free of diseases and insect pests. However, since 1973, the winter temperatures in Alaska have increased by 2-3 C°. It is logical to assume that continued global climate change could produce conditions that are more favorable to insect development or new or emerging pests in the state. This work reports on the insect pest associated with agricultural settings in Alaska. Pest surveys were conducted from 2003 to 2006 in interior Alaska and the Matanuska Valley. Peony (*Paeonia* spp.) is affected by thrips, *Lygus borealis* Kelton, and *L. punctulatus* (Zelterstedt). *Brassica* sp. is affected by a

complex of insects including root maggot (*Delia* spp.), aphids (*Macrosiphum* sp.), and diamondback moth (*Plutella xylostella* [L.]). Lettuce production is affected by various species of aphids and flea beetles (Chrysomelidae). Insects associated with potato include various species of aphids [*Myzus persicae* (Sulzer), *Macrosiphum* sp.], leafhoppers [*Macrosteles fascifrons* (Stål) and *Balclutha punctata* (F.)], and click beetles (*Hypnoidus* spp. and *Selatosomus* sp). Arguments on whether these represent new or emerging pests for Alaska will be presented.

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## Session 5: Creating Northern Agriculture Awareness

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### **Northern Healthy Food Initiative (NHFI)**

Dennis Hodgson, Co-Chair

Manitoba Agriculture, Food & Rural Initiatives' Northern Food Team

The NHFI is an initiative of the Province of Manitoba's Healthy Child Committee of Cabinet. By mandate of the Healthy Child Committee of Cabinet, the Northern Food prices project was established and completed in December 2002. While the report identified seven priority strategic options the Northern Healthy Food Initiative was the first of those priorities to be implemented. The Northern Healthy Food Initiative is a comprehensive and long term strategy to build capacity for local food production activity in the north. As nutritious foods are produced, harvested, processed and marketed locally, food costs are reduced by replacing the imported product with a local food supply. The NHFI has implemented two other strategies of the report in northern gardens and northern greenhouse activities. This presentation is Manitoba's experience to date and some lessons which are being learned.

### **Climate Change and its Impacts on Northern Lands and Ecosystems**

Yu Zhang

Canada Center for Remote Sensing, Natural Resources Canada

Global average temperature increased 0.74°C in the last 100 years and air temperature at high latitudes increased at almost twice the global average rate. Climate models estimate that global air temperature may increase 1.8-4.0 °C in the 21<sup>st</sup> century and increase 6-8 °C in northern high latitudes. This significant change in climate would have profound impacts on northern lands and ecosystems. This presentation will discuss some of the major impacts observed and calculated from models, site measurements and remote sensing. The impacts include changes in permafrost distribution, growing season length, vegetation distribution, snow/ice and water supply, land use issues, and greenhouse gas emissions. These changes would provide some insights into new opportunities and challenges for agricultural development in circumpolar regions.

### **Preliminary Results of Studying Antigenic and Immunogenic Properties of the Vaccine from Strain Brucella Abortus 75/79 – AB in the organism of Reindeer.**

Sleptsov E.S.

Doctor of Veterinary Sciences

Academician of the Russian Academy of Natural Sciences

A new vaccine against brucellosis from a strain of weak agglutinin Br.abortus 75/79-AB, has shown that its application in the common complex of actions against brucellosis allows an intensity of epizootic process to weaken sharply and within 12-18 months to achieve liquidation of epizootic nidus of brucellosis of the cattle. All these facts have allowed us to consider the work with given vaccine for perspective and to recommend for testing for brucellosis in reindeer. In view of this we have investigated the antigenic and immunogenic properties of a vaccine from strain Br.abortus 75/79-AB in an organism of reindeer. The results of studying the reactogenic properties of a vaccine from strain Br.abortus 75/79-AB I testify that the parameters of a physiological condition of an organism at hypodermic immunization depend on the dose of a preparation (reactogenic properties are less expressed at introduction of 25 and 50 m.k.).Also, the vaccine does not possess abortogenic properties. The analysis of the data on studying the capacity of acclimatization shows that the vaccinal strain Br.abortus 75/79 is well settled in an organism and causes development of benign generalized process with the hypodermic method of introduction of the vaccinal strain Br.abortus 75/79-AB in doses of 25,50 and 100 billion.m.k. for 15 day. Tests of the vaccinated animals (75 and 90) established that at the time of slaughter brucellas of the

vaccinal strain are practically eliminated from an organism of deer. Results of reactance of a vaccine from strain Br.abortus 75/79-AB at introduction in an organism of reindeer confirm that the given strain has properties of the weak agglutinin and the diagnostic titres in whey of blood of grafted animals drop out for 70 days. Allergic research carried out with the use of brucelline ВИЭВ has shown that the percentage of positivereaction onfor70 days after vaccination makes up 22,2-25,0 % and as a whole does not depend on a dose of introduction of the strain. Results of verification of an intensity of immunity in reindeer injected with a vaccine from strain Br.abortus 75/79-AB has shown that reindeer given vaccine in different doses of hypodermic introduction resisted infection of the strain Br.suis 1330 in a dose of 25 mln.м.к. (100 % immune).The received data testify that the vaccine from weak agglutinin strain Br.abortus 75/79-AB is harmless for an organism of deer and suitable for prophylaxis of immunity of the brucellosis in reindeer. The dose of 50 billion м.к is optimum for reindeer.

### **Community Food Security: A Discussion on the Benefits of Locally Grown Produce in Hay River, Northwest Territories**

Jennifer Redvers  
Student of Global Resource Systems  
University of British Columbia

The main goal of this research paper is to assess the benefits of locally grown produce in the north and to investigate the possibilities of increasing the amount of locally grown produce, specifically, in Hay River, Northwest Territories. I will investigate the feasibility of growing and selling produce in this area on a larger scale, and get an idea of some of the issues involved in this process. Through research, interviews and a survey process, I will try to get a feel for how local residents view this issue, and if there is a general interest and support for the local production of vegetables. I will also give recommendations on where communities in the NWT can go from here in encouraging more local farming operations.

### **Creating Northern Agricultural Awareness**

Dr. Olga Ivanova  
Deputy Director, Magadan NE Agricultural Research Institute

The present implementation tendency for creating northern agricultural awareness is the creation of purposeful management, the complex technology of environmentally safe agricultural production industry, the efficient differentiation of the possibility of using arable lands, depending on the content of bio-philos and toxic concentrations of microelements, and a theoretically substantiated forecast of biogeochemical condition of agro-landscapes considering the impact of an anthropogenic factors complex. The creation of a biogeochemical model of agro-landscape development, considering specific features of each concrete region, is assumed as a principle. This biogeochemical model of agro-landscape development in the North Far East is based on a theoretical substantiation of a methodological approach to the complex assessment of biogeochemical conditions of territories as a principal solution to the major scientific problem of nature management and environmental protection on the regional level, having important social-ecological and national-economic meaning. The proposed model has important practical meaning: it allows us to formulate requirements for the assessment of soil conditions in the process of their development and use, to undertake a complex of measures to carry out these requirements and to assess their economic and ecological reasonability; to carry out complex assessments of regional agro-ecological soil conditions and the prospect of increasing fertility levels on the basis of integral and specific indicators of the biogeochemical conditions of agro-landscapes; and to create real possibilities for ecological risk prevention in the process of choosing the directions of use and exploitation of concrete native and anthropogenic soil and vegetable complexes. A computer programming complex of proposed technology allows us to do work for short- and long-term prognoses of the biogeochemical soil conditions of the region while considering the impact of a complex of anthropogenic factors.

**Gwynne Dyer**  
**London, England**

The Intergovernmental Panel on Climate Change predicts that the average global temperature will rise between 2 degrees and 6.4 degrees Celsius by the end of this century. A World Bank study in India last year suggested that even 2 degrees hotter means a 25 percent cut in Indian food production. The core problem with climate changes is not sea level rise or bio-diversity; it is food supply. We are just barely able to feed the current six and a half billion people on the planet, thanks to the Green Revolution and a shift to very energy-intensive agriculture. But there is no second Green Revolution coming, and there are still lots more people coming. Start subtracting significant amounts of food production, and significant numbers of people are in trouble. At 2 degrees hotter, many hundreds of millions are at risk. At 5 degrees hotter, there are no good options left. But the misery would not be equally shared. As rainfall patterns shift, some countries lose most of their best crop-lands -- India, China, the United States, the Mediterranean countries, southern Africa, Australia -- while others come through the change unharmed or even gain new food-growing areas in the sub-Arctic: Canada, Britain, France, Germany, Scandinavia, Poland, Russia, Japan and New Zealand. This has very large strategic, economic and even moral implications for countries in the higher latitudes, and it is not too early to begin thinking about them.

**Cutting and Fertilizing Permanent Lowland Sheep Pastures to Optimize Lambs' Weight Gain in Northern Norway**

Svein Morten Eilertsen

Senior researcher, Norwegian Institute for Agricultural and Environmental Research, Arctic Agriculture and Land Use Division

In Norway, about two million head of sheep annually graze on unimproved range, mainly in the mountains. The past ten years, total annual losses of animals during grazing have increased from 3.7% to 6% simultaneously with increasing numbers of predators. Predator-safe grazing areas along the coast have been abandoned due to changes in the agricultural structure. Sheep gradually graze new plant shoots from the valleys in spring, tracking phenological gradients to the mountain areas in late summer. On the lowland all plants initiate and develop more or less at the same time early in the summer. Therefore, the quality of lowland pasture decreases from mid summer, and the lambs' daily weight gain drops during this period. In general, lambs grazing on mountain pastures during the summer are heavier in the autumn than lambs grazing on permanent lowland pastures. A study involving a harvest and fertilizing regime was initiated on a permanent lowland pasture to optimize lambs' daily weight gain during summer in 2004 and 2005. Through early grazing start in spring, cutting down ungrazed vegetation in early summer to initiate regrowth of high quality pasture and adding fertilizer to increase the quantity of available pasture, a high growth rate (above 300 g/day) was maintained in lambs during the whole summer grazing period.

**NWT Soil Survey Enhancement Project**

J. Nelson and Gene Hachey

In the fall of 2005, the Northwest Territories Department of Industry, Tourism and Investment (ITI), retained EcoDynamics Consulting Inc. to compile, review, digitize, and where needed, enhance the existing NWT soil information base, including derived soil capability interpretations. The overall purpose of the project is to ensure that adequate soil information is available to meet current and future agricultural planning and management needs in the NWT. Core funding for the project comes from the *Canada - NWT Agricultural Policy Framework Program*.

Over the past year, existing soil maps were compiled, scanned and the soil polygon (linework) digitized and conflated to a LandSat orthobase to produce a spatially correct, GIS-ready product. While the entire soil map coverage was digitized, most field and map enhancement effort is focused on lands within 30 km of twelve (12) NWT communities with known or anticipated agricultural capability, namely: Ft. Resolution,

Ft. Smith, Hay River, Enterprise, Ft. Providence, Kakisa, Jean-Marie River, Trout Lake, Ft. Simpson, Ft. Liard, Nahanni Butte, and Wrigley. The primary purpose of the fieldwork was: to assess the adequacy of existing soil maps and their accompanying soil capability for agriculture interpretations; enhance the maps where required; and conduct reconnaissance mapping in some areas with no existing map coverage.

The field program has confirmed the relatively high agricultural capability (Class 3 and 4) of most alluvial (river floodplain) soils across the study area. Reconnaissance work in the unmapped Trout Lake area, indicates widespread occurrence of rich alluvial soils, similar to those found in other areas of the NWT rated as Class 3 and 4. However, the actual agricultural capability of these soils at Trout Lake, and several other areas, remains in question until revised climate data is analyzed. Past agricultural capability assessment was based on pre-1975 climate data. As such, there is a need to utilize more current climate data, particularly in light of recent and anticipated climate change.

### **NWT Community Based Small Scale Foods Programs**

O.E. Hachey; Jane Brookes  
GNWT

Production of foodstuffs to supply community needs has a long and varied history in the NWT. Early settlers arriving quickly established small agri-foods operations to meet accustomed dietary needs. Both the Hudson Bay Company and early catholic missions contributed significant expertise in evaluating suitable varieties for local production. Various forms of agricultural production have been undertaken as far north as Inuvik where a current greenhouse based community garden continues to produce.

As transportation systems became more reliable local production of foodstuffs gradually declined. Elders in communities refer to early days when they worked on mission gardens and helped raise beef and dairy cattle however the present day generation has little or no knowledge of methodologies for production. Also, as is the case in much of the country current dietary trends have resulted in increased consumption of processed and frozen foods in portion controlled forms. These foods tend to have a longer shelf life than fresh produce and have very much displaced local production. The result being that stores in smaller communities tend to bring in very limited quantities of fresh produce with a subsequent higher associated price which in turn leads to less consumption of such foods.

Through a survey conducted by the Department of Industry Tourism and Investment a determination was made that the majority of communities in the NWT would be interested in reestablishing local food production systems. Most communities expressed a desire to have access to fresh, locally grown product however they lacked expertise in establishing systems to supply such product.

In conjunction with the Canada/NWT Agriculture Policy Framework Agreement a project was initiated which would assist with the establishment of community based small scale foods operations aimed at developing gardens in communities. The project is aimed at identifying; clearing and breaking identified sites in each community and providing for seeds and small tools for planting and maintaining. 13 communities are currently involved in the project and have established varying sizes of gardens and fruit production. The GNWT also provides technical and demonstrative assistance.

