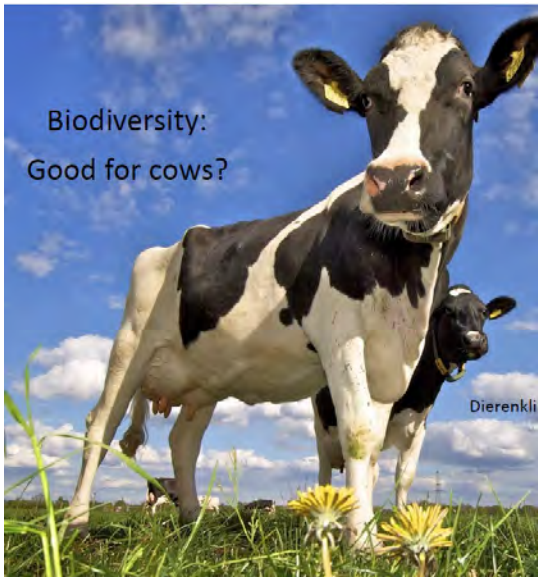
Seminar Nature Based Solutions: Herbs for dairy health in India and The Netherlands, October 2021

Organized by Dr. Balakrishnan Nair (India) and Dr. Maria Groot (Netherlands) in the framework of the Knowledge base program Nature-based Solutions for Climate Resilient and Circular Food Systems.

Case study: herbs and dairy

Dutch part and Indian part

Goal of the meeting exchanging experiences between farmers and scientists



natural livestock farming india

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Introduction

The Knowledge base program Nature-based Solutions for Climate Resilient and Circular Food Systems contains different case studies. In this seminar we Case Study herbs and dairy was covered. This case consists of a Dutch part and an Indian part. The goal of the meeting was to exchange experiences between farmers and scientists from both countries. The meeting was chaired by Maria Groot, Balakrishnan Nair, and em. Prof. Natesan Punniamurthy. The meeting took place online on October 21th 2021.

Program

13:00 Introduction on the topic Dr. Maria Groot DVM

13:15 The use of herbal remedies in India, em. Prof. Dr. Nair

13:30 Experiences: Farmer from India, Ms. Veda Manohar

13:50 Experiences: Farmer from India, Ms. Poongodi Suriya

14:10 Experiences: Farmer from India Ms. Lakshmi G.

14:30 break

14:50 Herbal grasslands, Drs. Hans Nij Bijvank DVM

15:20 Farmers experience, Mr Auke Spijkerman (unfortunately unable to be there due to illness)

15:40 Herbal grasslands, Dr. Jan-Paul Wagenaar

16:00 General discussion

16:20 Wrapping-up, Maria, Nair and Punniamurthy

Contents of the lectures

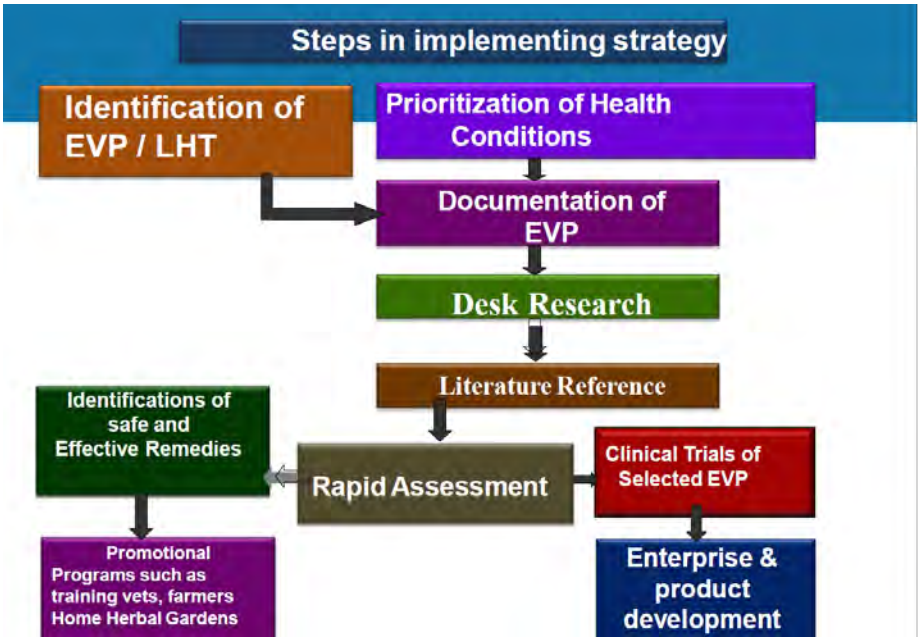
Maria gave the introduction to the seminar and presented the results already achieved in this project. Knowledge base WUR program runs from 2020-2022. In the 2020 the case study has addressed what herbs and which parts of the herbs are used in India for the different diseases in cattle. Next to the herbs, the active components, their biological activity and literature has been collected in a database. In 2020 we delivered a Factsheet on herbal gardens in India, a short paper on the use of herbal remedies in India and the database with remedies, plants, indications, main components, activities and literature. The program for 2021 consisted of an inventory of the state-of-the-art knowledge on the use of community herbal gardens. A report with an inventory of new diseases occurring due to climate change and identify which herbs can be used to help the animals maintain health and production in the Netherlands. This report will be published in 2022 as a paper and a seminar exchanging experiences. Today farmers and researchers from India and Netherlands share experiences. Although the different approaches and farming systems, we have a common goal: Healthy cows in a healthy environment.

Nair: In the lecture on the use of herbal remedies in India, Prof. Nair elaborated on the great achievements of the ethnoveterinary medicine in India. First he described the background. The dairy sector in India is an important component in rural livelihoods. To enhance production of milk, a cross-breeding strategy with exotic breeds was introduced in India in 1960s. The unintended side effect of this strategy was a high incidence of diseases in cross-bred animals. Therefore antibiotics had to be

extensively used. Indiscriminate use of antibiotics and other veterinary drugs in dairy animals leading to high veterinary drug residues in the animal products which posed threats to human health due to microbial resistance to antibiotics. Moreover crossbreeding led to loss of local breeds which have resistance to many diseases. This resulted in weak animals and poor farm management in many farms and reduced milk quality.

The alternative approach was the use of efficacious and safe Ethno-veterinary Practices (herbal formulations) that are available in India. They are used in preventing and curing certain clinical conditions in livestock, thereby reduced the drug residues in the milk. But they also performed research and extension work. Natural resources used in humans and livestock consists of > 6500plants, > 200 animal and other resource and > 50,000 herbal formulations. All parts of the plants are used. Concerning ethnoveterinary practices TDU and TANUVAS had documented Ethno-veterinary practices from 24 locations from 10 states, established that 353 out of 441 formulations documented are safe and efficacious. Moreover 24 remedies have gone through clinical observation studies. The assessment of the remedies was done according to the scheme below (figure 1).

Figure 1: assessment of herbal remedies



He presented some examples of herbal remedies for mastitis in cows consisting of A*loe vera*, *Curcuma longa* and calcium hydroxide, in chronic mastitis completed with *Cissus quadrangularis*) and research on the invitro-antimicrobial action against *E. Coli* and *Staphylococcus aureus* (Punniamurthy[a] et al., 2017). He showed some striking results concerning reduction of pH, Electrical Conductivity (EC) and Somatic Cell Count (SCC) in the milk before and after treatment of cows with herbal formula in comparison with normal values. Also reverse pharmacology was used to elucidate the effects of the herbal compounds. The bioactive compounds were tested for its effect against the target proteins of *S. aureus* using molecular docking studies (Punniamurthy[b] et al., 2017). He showed a graph with the abundance of *Streptococcus* and *Staphylococcus* in milk of control, mastitis affected and EVP treated cows, showing a significant reduction in pathogens. For other illnesses also the remedies were shown. Together with Punniamurthy they gave EVP training in 14 states in India. They gathered data form the NDDB, who founded an Information Network for Animal Productivity & Health (INAPH), an application that facilitates capturing of real time reliable data on Breeding, Nutrition and Health Services delivered at Farmer's Doorstep. It helps to asses and monitor progress of the projects. In this way feedback was gathered for many diseases and the effects of the herbal remedies.

S No	Ailment	Total treated cases	Total clinical recovery	% clinical recovery
1	Fever	113172	94583	83.6
2	Diarrhoea	110046	93658	85.2
3	Acute Mastitis	104475	82878	79.3
4	Chronic mastitis	52791	41502	78.6
5	Indigestion	27358	22961	83.9
6	Sub-clinical Mastitis	23986	19780	82.5
7	Anoestrus	17617	13132	74.5
8	Blood in milk	15718	13269	84.4
9	Repeat breeder	13262	9017	68.0
10	Deworming	11916	10690	89.7
11	Udder oedema	9567	7993	83.5
12	Wound	6534	5339	81.7
13	Retention of placenta	5744	4094	71.3
14	Bloat	5220	3959	75.8
15	Ectoparasites/ticks	4164	3444	82.7
16	Teat obstruction	4030	2714	67.3
17	Endometritis	3770	3056	81.1
18	Agalactia	2721	2048	75.3
19	Downer	2720	1801	66.2
20	Wart	2573	1802	70.0
21	Lumpy Skin Disease	2258	1693	75.0
22	Swelling/ Joint Pains	1913	1424	74.4
23	Prolapse	1543	1052	68.2
24	Poisoning (unknown origin)	647	448	69.2
	Total EVM Treatment	543745	442337	81.4

Feedback from various milk societies from NDDB through INAPH * on the Efficacy of EVPs for 24 clinical conditions in cattle from 2017-18 to 2021-22

Table 2: Results of EVM on antibiotic residues one year after intervention

Antibiotic residue: Farmer's samples one year after intervention

MILK Union	Number of farmers	Antimicrobial residue Negative	residue Low Positive	Residue Positive
Allapra	15	12	2	1
Arakkapady	15	11	2	2
Chakkampuzha	10	10	0	0
Maneed	10	07	3	0
Manikyamangalam	15	12	2	1
Monippally	10	06	2	2
Puthrika	10	10	0	0
Sreemoolanagaram	15	15	0	0
Thirukanurpatti (TN)	20	20	0	0
Aralumallige (Karnataka)	20	20	0	0
	140	123	11	6
Per cent		87.86%	7.85%	4.29%

He also showed results of disease incidence from 2016-2019 (table 3)

Table 3: reduction of disease incidence

Disease	Mastitis			Enteritis			Repeat breeding			Cowpox		
Year	2016	2018	2019	2016	2018	2019	2016	2018	2019	2016	2018	2019
Average incidence per union	66	37	11	11	7	4	9	3	1	3	2	0
Per cent reduction		44%	84%		35%	81%		71%	96%		11%	100%

Table 4. Average expenditure in Rupees for the treatment with Conventional medicine and EVP-the saving (1 USD = Rs.73.52 on 01/12/ 2020)

No	Disease conditions	n	western drug treatment	EVP treatment	Amount saved
1	Mastitis	35	3000	120	2880
2	Maggot wound	28	962.5	60	881.7
3	Bloat& Indigestion	34	719.4	224	495.4
4	Repeat breeding	23	3060.7	430	2630.9
5	Cow pox	18	583.3	335	250
6	Foot and Mouth Disease (FMD)	22	3165	1640	1525
7	Diarrhea	3	500	166	334

India shares their knowledge with others concerning: 1) Train on documentation of local health tradition and resources 2) Train stakeholders on use of herbal medicine on Livestock primary health care and reduce antimicrobial residue in the animal products 3) Establish Home/institutional herbal gardens 4) Pilots with herbal remedies.

Farmer's stories

Ms. Veda Manohar told her life story. She and her husband decided 10 years back to go back to their home village, and practice agriculture, when they were 50 years of age. They lived in Bangalore and returned to Guddadahatti village, 250 km from Bangalore. It was difficult to shift from their political and social background in Bangalore but their decision was strong enough. Their aim was to build an Organic farm with a learning centre for those who interested in an organic way of living and farming. The farm is situated in Chikkamaglore district the border of Bhadravthi and Tarikere Taluk. At first they followed the neighbour's way of cultivation, with sugarcane and paddy in open field, banana as intercrop in the coconut plantation. But they didn't make the profit. The main expenditure goes to fertilisers, labours cost and cultivation equipment rentals. Then they discussed with so many people and find the reason. Slowly they started organic farming, for this there was a need for organic fertiliser. Then they started dairy to aiming to produce organic milk. For organic farming, dairy is an essential part. In the beginning they faced so many difficulties, every day they had to call the Veterinary doctor and he was using heavy antibiotics to treat cows. This leads to other problems for them and the cows also. The first years it was really difficult. They used to work 20 hours per day and encountered a lot of problems, like mastitis, foot rot, repeat breeding, for this they used to call veterinary doctors every time. It was more expensive and time consuming, so they thought of using alternative medicine and started using Ethnoveterinary practices, Ayurveda and Homeopathic medicine. They followed the EVP workshop at Panchamaveda on 17-08-2014 with Dr Punnyamurthy and Dr Kumar. They invited Ayurveda Doctors for a work shop. Initially it appeared that preparation time is more compared to allopathic medicine. But once they started to use it was easy. Now they are treating successfully for "mastitis, Foot Rot, Edema". They have more than 50 cows treated till now, without any antibiotics. Now they have no mastitis in their dairy, or maybe one or two per year. They even got a certificate of the Animal and Fisheries Sciences University Karnataka based on a test on antibiotic and pesticide residues in their milk, where none were found. They are now organic in the true sense: free from antibiotics residues; their milk is antibiotic, chemical and fertilizer free milk. Since more than 7 years! Their experience is that dairy design is also important for successful dairy. In their dairy there are no walls, it is an open and partially shed, with plenty of air and light. The cows have a paddock facility to walk and drinking water when it's required. Silage is necessary as feed and they are making regularly around 70 ton of silage. They are growing they required medicinal plants organically in the farm, like turmeric, ginger, *Aloe vera* and *Cissus quadrangularis* and tulsi (holy basil). They can treat mastitis, fever, oedema, foot rot and indigestion according to the Ethno-veterinary practices in Panchamaveda. They want to go more natural and started their own breeding program for the cattle, using their own bull (Jersey x Sahiwal). She has been to the Netherlands in the framework of the exchange program. You can her farm on a short video on YouTube.

The next farmer was **Ms. Poongodi Suriya** from Mahizham organic farm, certified organic farmer since 2009. She is a farmer with heart for her farm. “Every time when I am visiting the barn it gives me great strength to work”. Herding hired cattle over-night in the field is one way of natural farming. Bio-manure: they used Sesbania crop for mulching purposes. They use natural green biomass for enriching soil nitrogen. Vermicomposting is another way of their organic farming activity and use Umblachery a native breed of cattle (figure 1) used for their organic farming.

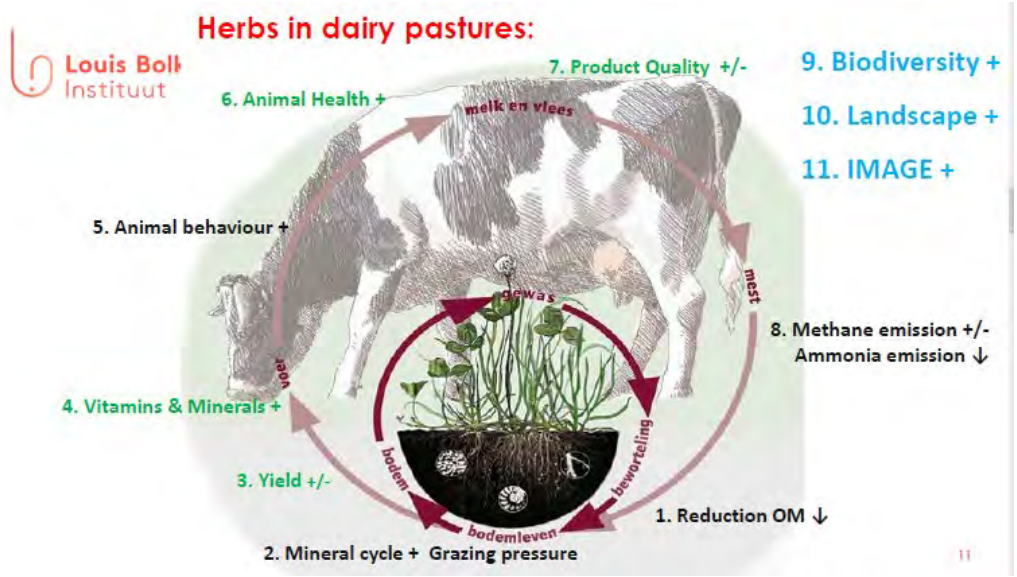
A traditional variety of paddy is grown; they practice organic yam cultivation and have Plaintain-bananas. Copra form coconut tree for virgin coconut oil, is another organic product from their farm, as well as Turmeric, the major crop in their region, where manual de-weeding is applied. The use an intercropping system is done among the Coconut trees where the lush green foliage of organic turmeric grows. The also grow Organic Tapioca-cassava, the major crop for sago. Next to these plants also vegetables like egg plants and bitter gourds are grown. And they grow their own fodder for the cows. She feed the cows personally, regarding them as the partners in the farm, taking care of their health and welfare. They have experienced that when animals are sick using EVM is the best way to treat them. They use only EVM and the veterinarian only comes for pregnancy diagnosis and artificial insemination. Their use of the Ayurvedic remedy for mastitis, with *Aloe vera*, turmeric and chunna, provided the major success which enabled profit in dairying. With remedy mastitis is cured in 5 days and since 15 years mastitis is no issue on their farm. She tested the earlier version of EVM herbal recipe of Dr. Punniamurthy for FMD was used and tested way back in 2011. Now they use the fine-tuned version. She showed impressive results of treatment of an open infected fracture in a hindlimb of a heifer, with local application of basil (*Ocimum basilicum*), Indian nettle *(Acalypha indica*), Garlic, *Centella asiatica* in coconut oil, and Devil’s backbone (*Cissus quadrangularis*) orally for 14 days. They used Neem leaves, turmeric in Gingili oil for goats and kids with “Sore mouth disease”. When they had an outbreak of Lumpy Skin Disease (LSD) they could treat this disease, as advised by Dr. Punniamurthy with Betel leaves, Pepper and Salt. Their successes lead to many neighborhoods farmers also resorting to EVM. The Annual Harvest festival and thanks giving to cattle in the month of January –is a family fest. They have travelled the world with their family.

The last Indian farmer to speak was **Ms**. **Lakshmi G** from Ottathaikkal Farm. After 10 years of life in flats in cities, in 2014 they moved to their ancestral home in Puthiyakavu, Tripunithura Kerala state. The Initial plan was only to stay & maintain the house, but they eventually started developing a garden & watch dogs, and later added poultry varieties and added a cow and goat. Gradually the number of cows kept increasing and the calves were also grown in house. Till 2018 dairying was taken primarily as an engagement without profit. There was a demand for pure milk and milk product, therefore they Registered a Farm entitled Ottathaikkal Farm and took FSSA (Food safety and standard act) Packing and other statutory licenses. Presently, milk & milk products like Curd / Paneer/ Butter Milk / Butter & Cow Ghee are produced and sold from home. The farm has now 14 Cows & 3 Goats as part of dairy. They also developed automation for milking, washing, cream separation etc.

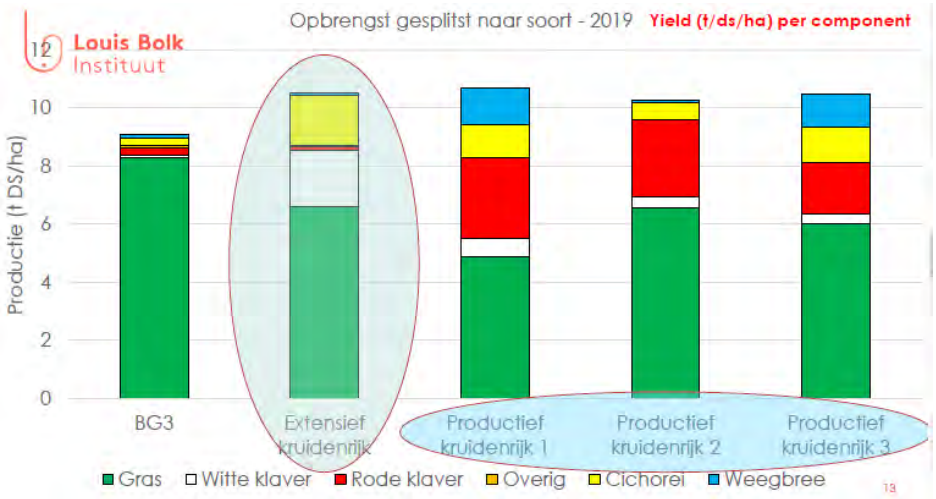
The challenges they encountered where lack of good veterinary services even at emergencies. The service was largely rendered by a retired Live Stock Assistant as availability of veterinary doctors was difficult. Another problem was lack of good quality semen and irrational insemination & success rate was very poor. And the biggest challenge was for keeping the quality of milk and customer satisfaction. Mean time they have attended a training program on the preparation and application of Ethno-veterinary practice to reduce antibiotics and other chemical veterinary drugs. This program was supported by Department of science and Technology Government of India conducted by Dr. M.N Balakrishnan Nair, P.K Narayana Kaimal and Abhilash Raju at Manikkamangalam Milk Society. The Secretary of the Manikkamangalam Milk Society introduced them to Abhilash Raju who is part of the Ethno-veterinary team. Abhilash Raju trained them and extended his service of to familiarize Ethno-veterinary herbal treatment in the farm. He is also an expert in artificial insemination and a trained Ethno-veterinarian. therefore they used Ethno-veterinary Practices to treat the animals. Last 2 years along with Mr. Abhilash they had corrected repeat breeding and he assisted in Pregnancy diagnosis and other clinical conditions of cattle. They are now able to manage FMD, Repeat breeding, Diarrhoea, Anaplasma, Theilerioses and lumpy skin Disease (LSD). She has a small area for growing herbal plants, rice and vegetables. Many of the ingredients of Ethno-veterinary formulations are present in the kitchen (Turmeric, cumin, coriander, fenugreek, assa-foetida, onion, garlic, ginger, coconut oil, sesamum oil). She grows few medicinal plants like *Aloe vera, Curcuma longa, Mimosa pudica, Zingiber officinale, Ocimum sanctum* and fodder grass. The rest of the plants needed like *Andrographis paniculata* they outsource. By using EVP their health expenditure has come down substantially and they are able to manage the health of our livestock more effectively. Future Plans are to get the milk and milk products tested for antibiotic residues. They aim to provide a residue free certified milk and the milk products to the consumers. Moreover they want to learn more EVP for other clinical conditions and use them even for prevention of diseases.

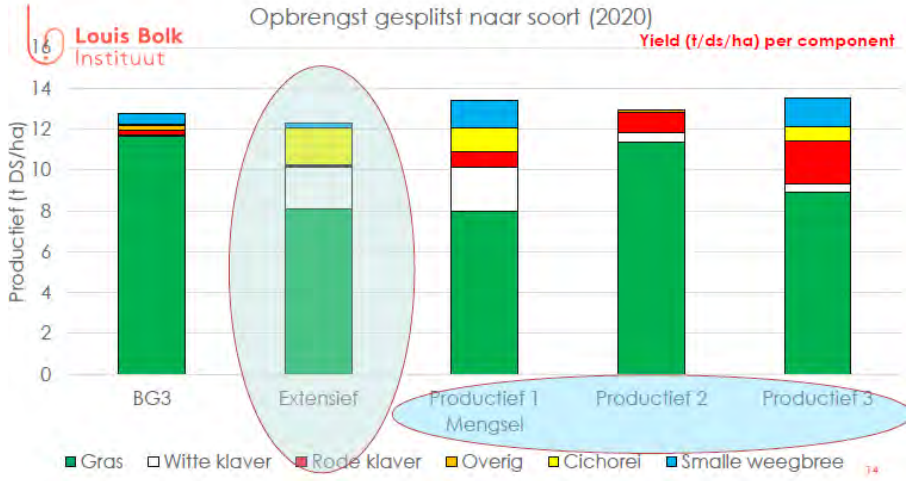
From the Dutch side the farmer could not attend due to health conditions.

Dr. Jan-Paul Wagenaar from Louis Bolk Institute presented Pasture herbs, developments in Dairy Farming. Herbs, multi species pastures, are popular with Dutch Dairy farmers. He showed pictures of pastures, growing and seeding herbs and cattle grazing them. Herbs, multispecies pastures, are popular with Dutch Dairy farmers. Two decades of small scale experimentation and demo's did not result in adaptation, but in promoting pasture herbs to improve BIODIVERSITY, promoting pasture herbs to improve SOIL QUALITY, three DRY summers (2018 2020) and climate debate, FINANCIAL REWARDS form Dairy Industry (Royal Friesland Campina, AWARE, etc.), Public appreciation and initiatives of NGO's to provide farmers with subsidized seed. This resulted in 1000's of hectares of pastures with productive herbs grass mixtures. There remain four persistent questions. What do you mean with 'multi species pastures'? How do I keep herb species in my pastures? How do herbs fit in my farm / farming system? And last but not least: Are multi species pasture economically viable?



He showed some graphs production results of different herbal mixtures in 2019 and 2020:





Data on average feeding value of the fresh product.

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2019 – average feeding value (fresh product)

Mixture	Crude protein	Energy				Crude Fiber
Mengsel	**Ruw eiwit %**	**DVE**	**VEM**	**Cu (mg/kg)**	**Zn (mg/kg)**	**Ruwe Celstof**
BG3	16,1	76	929	7,4	38	161
Extensief	18,1	79	941	10,4	66	181
Productief 1	18,1	80	947	11,6	74	181
Productief 2	18,0	80	937	9,5	50	180
Productief 3	17,0	77	945	11,5	71	170

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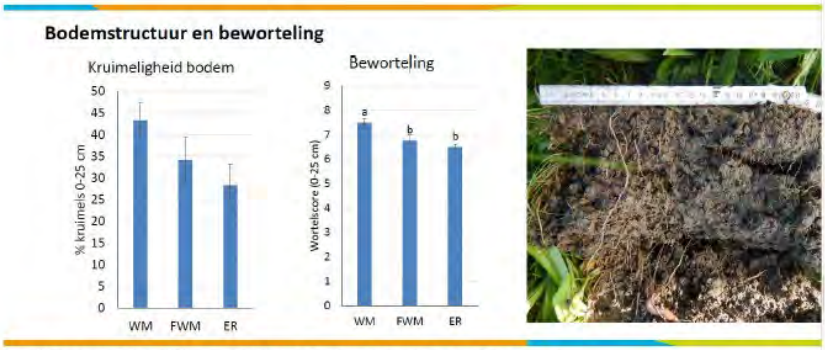
Soil structure (left) and Root score (right)



- Weidevogelmengsel (WM) kruimeligere bodem en betere doorworteling van de bovengrond

WM = natural herbs/grass mixture FWM = pred. Functional herbs/grass mixture ER = English rye grass

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Biodiversity: common herbs can contribute to presence and survival of bees and insects

Field thistle

Caraway

white clover

dandelion

chickweed

Soort	jan	feb	mrt	april	mei	juni	juli	aug	sept	okt	nov	dec	Kwaliteit
Akkerdistel						5	5	5	5				N+S
Boerenwormkruid							3	3	3				n+s
Cichorei							3	3	3				n+s
Duizendblad						1	1	1	1				-
Esparcette					5	5							N+S
Fluitenkruid					2	2							-
Gewone Berenklauw						3	3	3	3	3			n+s, P
Herderstasje			3	3	3	3	3	3	3	3	3	3	n+s, P
Kamille reukeloze						1	1	1	1				-
Karwij					5	5							N+S
Klaver rood					1	1	1	1	1	1			-
Klaver wit					**5**	**5**	**5**	**5**	**5**	**5**			**N+S, P**
Kruipende boterbloem			2	2	2								S
Luzerne						4	4	4	4				N+S
Madelieje				1	1	1	1	1	1				-
Paardenbloem			5	5	5				5	5	5		N+S, ZP
Pimpernel							4	4					N+S
Rolklaver, gewone						3	3	3	3				n+s
Smalle weegbree					3	3	3	3	3				S, geen n!
Vogelmuur	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**n+s, P**
Wilde peen						4	4	4	4				N+S

Continuous **pollen (S)** availability is an important lifeline for insects, **Nectar (N)** fuel for flying, feed for larvae and winter supplies P period

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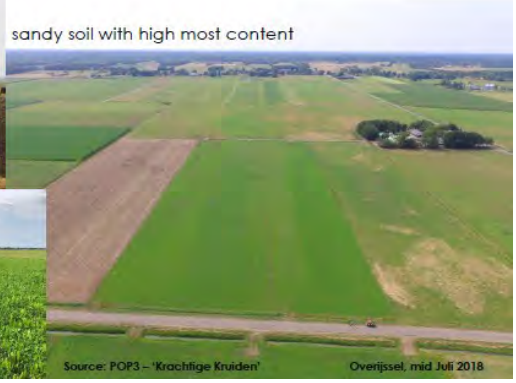
Demonstration Eesveen, Province of Overijssel, 2018-2020

sandy soil with high most content



He also showed results on milk production and quality (experimental data in green)

He concludes that 1) herbs are a suitable tool to initiate a system change to soil oriented, low fertilizer attractive production under 'extreme' conditions! But there is a need for more education, farm learning & experimenting towards sustainable farming. 2) It is not a single 'advantage' which makes pasture herbs work; the accumulated benefits of all aspects make the difference! And 3) There is more than pasture herbs, sometimes it is wiser to go for grass or to refrain from tillage at all and embrace old (in age) pastures with 'natural' botanical composition, etc.

DVM Hans Nij Bijvank was the last presenter. He is a dairy practitioner in the North of the Netherlands. He told us about his inspiration for the use of herbs for health. Eyeopener was the visit to India in 2014 with farmers and veterinarians and the principles of Ayurveda. He learned about the treatment of mastitis with Aloe Vera and curcuma. But then you have to milk the cow 10 times per day, wash with warm water and apply the paste. In India they get clinical recovery but did not look at somatic cell count or bacteriologic assessment. He also learned a remedy for calf diarrhea which he uses in his practice. According to the principles of Ayurveda aim is to get balance, not to kill bacteria. They use the whole or parts of plants, not one isolated component or molecule. Also they think fresh is always better than conserved and local plants are better than those from far away. This different in the Netherlands, dr Punniamurthy stated "Netherlands has completely gone chemical". There is no botanical knowledge in veterinary school and old veterinary knowledge (< 1940) appears completely forgotten. But according to Ayurveda "Single molecule treatment is not natural". The question is how can we use these principles in the Dutch dairy farms? Aim must be to seek more balance in the animal and the microbiome of the soil, the intestines and the udder. Don't treat with single molecules (antibiotics) and think about which local plants are useful (in the pasture). He mentions the plants that make up most of the diet of cattle- Grass, corn, soyhulls, rapeseed, clover, and alfalfa and fodder beets. In wild animals the variation in species that are eaten is much higher, for chimpanzees up to 175 different plants and wild herbivores eat 50-75 different species of plants per day, of which3-5 species form the bulk of the diet (Fred Provenza). The rest is consumed for health benefits.

He shares his experience with farmers who work with herb-rich, multispecies pastures. He talks about secondary metabolites in herbs and the benefits of multispecies pastures. And the question do herbivores need secondary metabolites to stay healthy? The interest in the use of herbs on Dutch dairy farms nowadays is growing. Mainly for cow health: giving the cow more diversity, but also for improving the soil. Farmer's main concerns are whether they will get enough dry matter per hectare? (>10.000 kg dm/hectare and the costs and persistence of the herbs). He describes some common pasture herbs like plantain and dandelion and their constituents and their health benefits. Plantain contains many secondary metabolites like aucubin which acts mildly antimicrobial, has laxating, anti-inflammatory, liver-protective and anti-oxydant properties. Another ingredient is acetoside, which acts mildly antimicrobial (urogenital infections), works anti-fungal, anti-oxydant, and regulates blood-pressure. Tannins act on (protein-digestion in the rumen, and have anti-parasitic properties. Mucilages are

polysaccharides, gel-forming and protecting the gut wall. Dandelion has a bitter taste and so stimulates saliva production and digestion, contains flavonoids, is high in potassium, magnesium, selenium and cobalt. It supports liver function and is resistant to drought because of its taproot. Plants that contain tannins affect health in different ways. They have an effect on protein digestion in rumen, form complexes with free protein in rumen, they can slow down digestions and change to intestinal digestion(eg. *Lotus corniculatus*). This leads to reduced loss of protein to ammonia and reduces methane-production (Esparcette (*Onobrychis viciifolia*). Chicory has high levels of minerals, high Potassium, Calcium, Zn, Copper, and Phosphor. Moreover it has a good energy and protein content. Secondary metabolites consist of tannins, lactucin, lactupicrinand8-deoxylactucin, chicoriin (coumarin), chicoric acid. According to literature these metabolites affect insulin /glucose metabolism, work antiviral, anti-inflammatory and liver protective. He shows an interesting experiment: Research Ireland sheep and lamb performance on multispecies grassland. The results showed that ewes on multispecies pasture maintained their weight during suckling period and ewes on grass monoculture pasture lost 4/5 kg weight. After6 weeks the lambs on multispecies grassland had on average 1-2 kg more weight and growth till slaughter was 10% higher on multispecies versus monoculture grassland. Results were published (Grace et al., 2019). Production of dry matter feed of the multispecies fields were the same as the monoculture fields with less Nitrogen per hectare: 90 kg N per hectare vs. 163 kg N per hectare. De-worming of the lambs: average 1.5 times versus 2.7 times in monoculture grassland. An example of multispecies mixture is shown. Commercial multispecies herb-mix for farmers: salad buffet: contains 70% Grasses: Perennial ryegrass, timothy (*Phleum pratense*), *Festuca arundinacea* , *Dactylis glomerata*. 15% Clovers: esparcette (*Onobrychis viciifolia*), red clover, white clover*, Trifolium repens*, *Trifolium hybridum* , *Lotus corniculatus, Mellilotus officinalis*; 15 % herbs: cichory, *Sanguisorba minor*, *Achille millefolium*, Parsley(*Petroselinum crispum*), *Plantago lanceolata.*

The wrapping up was done by Nair, Maria and Punniamurthy, looking back on a successful seminar and new contacts.

References

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Punniamurthy N, Sujatha P L , Preetha S P & N. Ramakrishnan. Analysis of the mechanism of action by molecular docking studies of one ethno-veterinary herbal preparation used in bovine mastitis IJANS. ISSN(P): 2319-4014; ISSN(E): 2319-4022 Vol. 6, Issue 5, Aug – Sep 2017; 23-30.

Annex 1 Background information on the presenters

Name	**DR. M.N. BALAKRISHNAN NAIR**
Present Position	*Professor Emeritus* *Head, Ethno-veterinary sciences and Practices*
Address for communication	**The University of Trans-disciplinary Health Sciences and Technology, 74/2, Jarakabandekaval, Attur post via Yelahanka, Bangalore - 560106, India** **Mobile +91 6360204672** e-mail: **nair.mnb@tdu.edu.in**
Date of birth	10 May, 1948.
Married or single	Married
Educational qualifications	**M. Sc., Ph.D. (Botany)**

Examination	Year of passing	University/ Board	Subject	% of marks
S S L C	1964	Board	Science	60.01
B.Sc.	1970	Kerala	Botany. Zoology & Chemistry	62.4
M.Sc.	1973	B.I.T.S Pilani	Botany	69.8 CGPA 6.98/10
Ph.D.	1978	S. P. University	*	@

* Developmental anatomy. @ The University awards no division or marks

I have passed the Junior German Certificate course of Sardar Patel University, V.V.Nagar, Gujarat

Research and teaching experience (after Ph.D)	38 years (6 Years Dept. of Botany, Sardar Patel University, VV Nagar 11 Years Department of Botany, University of Delhi, 3 Years overseas, Faculty of Forestry, UPM, Malaysia, 1 National Innovation Foundation, IIM Ahmedabad 1 Peermade Development society, Peermade 18 Years in –FRLHT- I-AIM-TDU)
Skills	Light and electron microscopy. Microphotography, Photography, Documentation and rapid assessment of Traditional health knowledge , training, extension work
Specialization	Plant anatomy and wood structure (gross and fine structure of wood in relation to seasoning and preservation, cambial growth), Non-wood forest products (**origin** of gum, and gum-resin and their secretion, and sustainable and improved tapping technique), Medicinal plants, & Primary health care (Promotion through training & capacity building of households, students & professionals) Ethno-veterinary practices (Promotion through mainstreaming EVP in veterinary curriculum, training farmers & households) to reduce antibiotic use and related residue in the animal product like milk and meat. Antimicrobial misuse and development of AMR Trans-disciplinary research and product development

40 Publications, 5 books, 5 edited volumes

Academic; **MSc. Birla Institute of Technology and Science (BITS), Pilani**

Ph.D.: SP University, VallabhVidyanagar, Anand

Worked: SP University, University of Delhi, University Putra Malaysia, PDS, Iduki, IIM Ahmadabad, TDU Bangalore

Country visited; France, Germany, the Netherland, Sweden, Switzerland, Hungary, Portugal, USA, UK, Bolivia, Malaysia, Singapore, Philippines, Hong Kong, Japan, Turkey, Greece, China, Cameroon, Keniya, Ghana, Uganda, Ethiopia, Sri Lanka, Thailand, Dubai

BIODATA

Name : **N. PUNNIAMURTHY MVSc PhD FNASc FISVPT FNSE**
Former Professor TANUVAS. Prof Emeritus TDU

Date and Place of Birth: 06.03.1957, Thanjavur, Tamil Nadu

Fields of specialization: Veterinary Pharmacology and Toxicology
Ethnoveterinary Herbal Medicine

Residence: #168, VI street
Rethinasamy Nagar THANJAVUR 613 006
Tamilnadu India Tel.No 98424 55833

- **Founder Director (2011-2017) for PG Dip Course in EVP for veterinarians offered jointly by TANUVAS and FRLHT Bangalore (50 veterinarians completed)**
- **International expert for antibiotic-free milk, meat and egg production through herbal medicine for treatment and prevention of livestock diseases.**
- **Trainer / Consultant on EVM based Veterinary herbal medicine for National Dairy Development Board (NDDB), DST Govt. of India**
- **Official trainer for veterinarians in Governments of Tamil Nadu, Kerala, Sikkim, Haryana, Punjab.**
- **Indian expert in Ethnoveterinary Medicine to Netherlands, Portugal, Ethiopia and Uganda under Indo-dutch exchange programme with FRLHT/TANUVAS/Dutch farm Experience**

Institution	Place	Degree	Year	Marks/ Award/prize
Madras Veterinary college, TNAU CHENNAI		B.V.Sc	1979	First Class
Madras Veterinary College, TNAU CHENNAI		M.V.Sc	1983	3.95 / 4.00
Madras Veterinary College, TANUVAS CHENNAI		Ph.D	1995	4.00 / 4.00
		Best Ph.D. thesis in avian studies- Gold medal 1996 convocation		
Ministry of HRD Govt. of India New Delhi		Diploma in Siddha Medicine and Science 2012 First class		
ALLIANCE FRANCAISE French embassy, Chennai		Certificate in French 1982 Grade : *Assez Bien*		

Academic experience service	- 41 **years** in teaching, extension and research as on 31.03.2021 in TANUVAS/TDU - Taught pharmacology and toxicology for under graduate and post graduate students for over 12 years. Research Methodology for PG students for 4 years.	
Guided Member	Two Ph.D 50 PGDip EVP Two Ph.D. Four M.V Sc.	Guided one TNSCST student project, awarded best project for the year 2000.

-Documentation/validation of traditional practices(Indian medical heritage) for livestock/birds
-First time large scale clinical use of indigenous / traditional veterinary medicine as a cost effective treatment alternative for livestock farmers especially in primary health care for sustainable livestock production in rural community.
-Mainstreamed ethno veterinary practices in veterinary institutional curriculum

Publications

Books/booklets/proceedings /chapters : 15
Research papers : 57
Others (popular articles) : 60
Paper presentation national /International: 90
Patent : Applied for one

Universities /Countries visited

McGill University,Canada **Guelph University** , Ontario, Canada	**Harvard University** , Boston University. **Tufts Vet school**, Mass. USA
Yedidepe University, Istanbul, Turkey	**Makerere University**, Kampala ,Uganda
Wagenegin University & **Utrecht University** the Netherlands	
Countries visited: **Canada, Denmark , Ethiopia, France , Germany, Netherlands, Portugal, Switzerland, South Africa, Sweden, Turkey, U K, Uganda and USA**.	

Projects obtained :

- Co-Principal Investigator for the DBT scheme "Rehabilitation of Tsunami victims through homestead goat and poultry farming" in four villages two in Tamilnadu and two in Karaikkal region, Pondicherry. Rs.74.2 lakh project for three years. 2005-08
- Principal Investigator of the Part II scheme "Establishment of Ethno Veterinary medicine Training and Research Unit" by Tamilnadu Veterinary and Animal Sciences University 2007-2010 RS 18.00 lakh
- Principal Investigator of the ICAR scheme on Outreach programme on Ethno Veterinary medicine 20012-2017 RS 80.00 lakh
- CO PI in ETC COMPAS Netherlands funded - TANUVAS-FRLHT- training 150 veterinarians under TOT mode on EVM to make milk free from drug residues 2014-16
- Obtained a Rs 1372 lakh Project for TANUVAS on ethno veterinary herbal product research and development centre from State Planning Commission Tamil Nadu under TANII scheme. GOVT of Tamilnadu 2017-2020
- PI, DST Govt of India, Rs 27.81 lakh SEED for three states on reducing antibiotics in milk 2017-2019

Experience/ major achievements /awards

Prof. N.Punniamurthy MVSc PhD dipSMS FSVPT FNSE, Professor of Pharmacology and Toxicology, took lead with FRLHT, in mainstreaming EVM into veterinary curriculum, he developed effective remedies against common diseases of livestock and poultry for farmers' self-reliance in primary health care. Apart from his effective recipe against mastitis, he developed an effective Herbal recipe for Foot and Mouth Disease, to be used by farmers and veterinarians officially by the department of Animal Husbandry of the states of Tamil Nadu and Kerala in 2013-2014 since then saved thousands of cattle from death and after effects of the disease across the country. He had visited Canada, the USA, U.K. France and presented papers in Turkey, South Africa, Uganda, Ethiopia, Denmark, Portugal, Switzerland and the Netherlands on EVM.

His pioneering efforts through telemode, has made possible the last mile connectivity in rural India, for primary veterinary health care. Wounds and inflammation, enteritis, rumen disorders, endo and ecto parasitism, reproductive disorders, mastitis, Foot and Mouth Disease and other infections are being treated with success, by both the farmers and veterinarians for twenty years in a standalone mode paving the way for AMR-free livestock production. He is currently a national trainer on EVM to veterinarians in a programme co-ordinated by NDDB and TDU Bangalore, to reduce antibiotics in milk. Twenty four of his herbal recipes are uploaded in the you-tube by NDDB for the benefit of farmers.

AWARDS

- Life time achievement award from **Indian Veterinary Association 2019**
- Awarded fellow of " **National society for Ethno pharmacology**"- **Feb 2017**

- Awarded fellow of "**Indian society for Veterinary pharmacology and Toxicology**"- November **2016**
- **Lifetime Achievement Award for promoting Siddha medicine** presented by Government Siddha Medical College, Palayamkottai, Tamil Nadu during Golden Jubilee Celebrations-**2014**
- **Tamil Nadu Scientist award** (TANSA) by the Tamil Nadu State Council for Science and Technology- for a decade of research accomplishments in EVM.- **2013**
- **Achievement award for Ethno Veterinary medicinal recipes dissemination**, awarded by THAMILAR VAZHVIYAL IYAKKAM, Trichy **2005** from Nammazhlwar
- Guided one **TNSCST** student project, awarded **best project for the year 2000**
- **Gold medal for best avian thesis in PhD** in **1995** in **TANUVAS**

Some Recent Publications/presentations

- Nair, M N , Punniamurthy, N (2021) Ethno-Veterinary Practices (EVP) as a New Approach for Management of Cattle Health without Antimicrobial and Other Chemical Veterinary Drugs *EC Veterinary Sciences 6.5, 22-25*
- Kumar SK ,Punniamurthy, N Deepa, Nair, M N. (2021). Prevention of mastitis in cattle during dry period using herbal formulation *Research Journal of Veterinary Sciences.* 4. 22.
- Satheshkumar,S, Punniamurthy, N, Ranganathan, V (2021) 'Herbal Combo Therapy' for Oestrus Induction in Postpartum Anoestrus Cows. *The Journal of Phytopharmacology,* vol.10(1) 19-21
- Dutta P, AV Hari Kumar, SK Rana, SB Patel, DD Patel, KR Patel, N Punniamurthy, MNB Nair and GK Shrama (2020) Management of common ailments of dairy animals with ethno-veterinary herbal preparations in Gujarat *The Pharma Innovation Journal* 2020; SP-9(8): 67-70
- Karthickkumar, N Sivaraman, S., Punniamurthy (2020) Field Study on the Beneficial Effects of Fresh Herbals against Warts in Cattle: A Review of Clinical Cases *International Journal of Current Microbiology and Applied Sciences 9(12):1354-1363*
- Ranganathan, V ,Punniamurthy, N Ahamad, D.B Satheshkumar, S (2020) Evaluation of hepatoprotective activity of Moringa oleifera in chicken. *The Journal of Phytopharmacology vol* - 9 175-177
- Suresh Bharat, Punniamurthy N and Nair M N B (2018), Dhanwantharam Kashayam for preventing post-partum complication in cross bred cows. Dairy & Vet Sci J 5(4):
- Punniamurthy, N. Ramakrishnan,N**.** Nair MNB and Vijayaraghavan,S (2017) I*n-vitro* antimicrobial activity of EVM herbal preparation for mastitis**.** Dairy and Vet Sci J 3(2
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- Punniamurthy N ,Sujatha P L , Preetha S P & N. Ramakrishnan 2017.**A**nalysis of the mechanism of action by molecular docking studies of one ethno-veterinary herbal preparation used in bovine mastitis. International Journal of Applied and Natural Sciences Vol. 6, Issue 5, Aug – Sep 2017; 23-30
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- Nair M N B**,** Punniamurthy N, Mekala P, Ramakrishnan N and Kumar SK.(2017). EVM Formulation for Treatment of Bovine Mastitis,. Journal of Veterinary Sciences S1. 25-29.
- Nair M N B**,** N Punniamurthy and S K Kumar (2017). Ethno-veterinary practices and the associated medicinal plants from 24 locations in 10 states of India RRJVS/Journal of Veterinary Sciences Vol.3(2),16-25.
- Nair M N B, N Punniamurthy & S K Kumar (2017).EVM for prevention and treatment of bovine mastitis. 65th Annual Meeting and Congress of the Society for Medicinal Plant and Natural Product Research (GA) September 3rd to 7th, Basel Switzerland
- Punniamurthy N, Nair M N B. & Kumar. S.K (2016). User Guide on Ethno-veterinary Practices.
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- Nair M N B, N Punniamurthy & S K Kumar.(2015) Role of Ethno-Veterinary Practices (EVP) in reducing of antibiotic residue & Antimicrobial resistance in livestock production system: – a field experience, 64th Annual Meeting and Congress of the Society for Medicinal Plant and Natural Product Research (GA) 2016,Budapest, Hungary

- Nair MNB, Punniamurthy N, Seethakempanahalli K (2015). Role of ethno-veterinary practices (EVP) in reducing antimicrobial resistance in livestock production systems: a field experience. Planta Med 2015; 81: SL3C_06
- Punniamurthy, N, Ranganathan, V. A D.Basheer, Satheshkumar,S (2014) Hepatoprotective activity of *Caralluma umbellata* in chicken Indian veterinary Journal 91 (12) : 33 -35

Punniamurthy.N
Translational Scientist –Veterinary Clinical Pharmacology

Name: Poongodi Suriya
Govt. Certified Organic farmer
Mahizham Organic Farm.
She rears Cows, goats and chicken. Crops include Paddy land races, turmeric, vegetables, coconut, EVM herbs. She prepares vermi-compost using native cattle urine and dung, for manuring all the crops she is growing. She helped Professor Punniamurthy in field validation of many EVM preparations.

Name: Ms. Vedavathi Manohar is a Certified organic farmer. From the city she has migrated to her village and established the farm with hard work. TDU team has helped her to learn and practice EVP and now mastered it. She has shared her experience with other organisation and also travelled with us to NLF exchange programme to the Netherlands.

Name: Ms. Lakshmi G.
Ottathaikkaal Farm in Udayamperoor.
Ms. Lakshmi also has her early life in cities and use to live in a flat. She and her husband decided to go back to their ancestral house and stated their journey for developing the farm. Now they sell milk and milk product and got registered with Food standard and safety authority India. She has been introduced to Ethno-veterinary practice again by TDU team when we were training one of the milk Union near their farm. Last 2 years she I using herbal alternative to antibiotics and other chemical veterinary drugs. She is preparing to get organic certification for her farm. She has cows, Goats, ducks and chicken.

Name: Dr. Maria Groot
Senior Scientist – Veterinary pathology, illegal use of hormones in production animals, antibiotics, contaminants, quality of meat and meat products, phytotherapy and the use of herbs as alternatives for antibiotics. Projects in the field of veterinary medicine, hormones, phytotherapy and the use of herbs as alternatives for antibiotics, animal experiments, animal health. 41 scientific publications, 10 invited lectures on conferences, 8 books on natural healthcare for production animals, 30 public reports.

Name: Dr. Jan-Paul Wagenaar Louis
Bolk institute: Program coordinator Sustainable animal husbandry & Agrobiodiversity. Articles in scientific journals (10), Proceedings etc. (27), Brochures, books & reports (21), Specialist journal articles, leaflets, newsletters, etc (55).

Hans Nij Bijvank DVM Dairy practitioner at veterinary clinic de “Woldberg”. Working together with Natural Livestock Farming, he was participant in the exchange program of Oxfam Novib and province Overijssel to India (2014) and Uganda and Ethiopia (2017).

Annex 2 presentations

Dr. Maria Groot

1

2

3

4

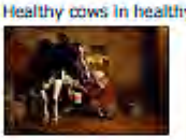
Program 2021

- What is the state-of-the-art knowledge on the use of community herbal gardens
- Inventory of new diseases occurring due to climate change and identify which herbs can be used to help the animals maintain health and production
- Report, will be published in 2022 as a paper
- Seminar exchanging experiences

7

Sharing experiences

- Today farmers and researchers from India an Netherlands share experiences
- Different approach
- Common goal
- Healthy cows in healthy environment



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Program

- 13:00 Introduction on the topic Dr. Maria Groot DVM
- 13:15 The use of herbal remedies in India, em. Prof. Dr. Nair
- 13:30 Experiences: Farmer from India, Ms.Veda Manohar
- 13:50 Experiences: Farmer from India, Ms. PoongodiSuriya
- 14:10 Experiences: Farmer from India Ms. LakshmiG
- 14:30 break

9

Program

- 14:50 Herbal grasslands, drs. Hans Nij Bijvank DVM
- 15:20 Farmers experience, mr. Auke Spijkerman, cancelled
- 15:40 Herbal grasslands, dr. Jan-Paul Wagenaar
- 16:00 General discussion
- 16:20 Wrapping-up: Maria, Nair and Punniamurthy

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Thank you for your attention!

To explore the potential of nature to improve the quality of life

11

Prof. Nair

natural livestock farming india

WAGENINGEN

Medicinal plants used in EVP

Prof. M N Balakrishnan Nair

Professor Emeritus & Head, Ethno-veterinary Science and Practice
Trans-Disciplinary University (TDU) &
FRLHT, 74/2 Jarakabandekaval, Attur Post,
Yelahanka, Bangalore 560064, India

nair.mnb@tdu.edu.in
Phone:+91 6360204672

1

NATURAL RESOURCES USED IN LHT
(Human & livestock)

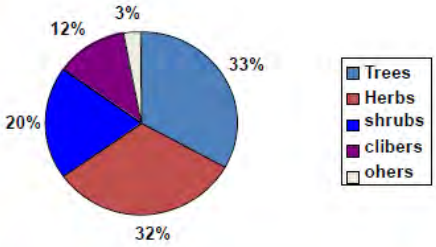
- > 6500 plants
- > 200 animal and other resource
- > 50,000 herbal formulation


5

Background

- The dairy sector in India is an important component in rural livelihoods.
- To enhance production of milk, a cross-breeding strategy with exotic breeds was introduced in India in 1960s.
- The unintended side effect of this strategy was a high incidence of diseases in cross-bred animals
- Therefore antibiotics had to be extensively used.

Plant resource



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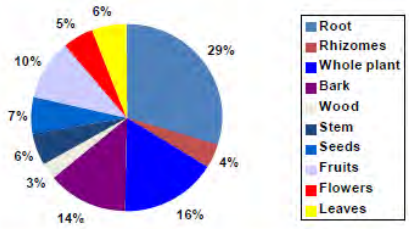
Background

- Indiscriminate use of antibiotics and other veterinary drugs in dairy animals leading to high veterinary drug residues in the animal products
- Threats to human health due to microbial resistance to antibiotics
- Loss of local breeds which have resistance to many diseases
- Weak animal / poor farm management in many farms
- Reduced Milk quality

3

Useful parts from the plant resource



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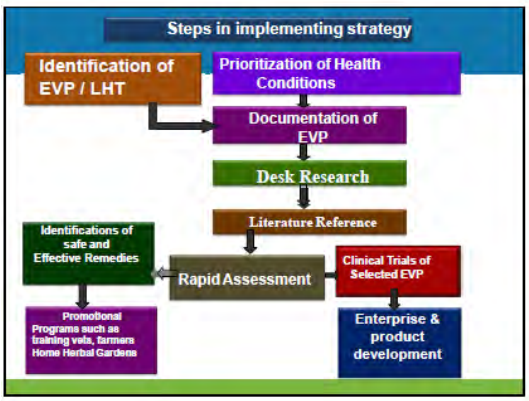
Alternative Approach

- Efficacious and safe Ethno-veterinary Practices (herbal formulations) are available in India
- They are used in preventing and curing certain clinical conditions in livestock
- Thereby reduced the drug residues in the milk
- Also do Research and extension work

Ethno-veterinary practices

- TDU and TANUVAS had documented Ethno-veterinary practices from 24 locations from 10 states
- Established that 353 out of 441 formulations documented are safe and efficacious.
- 24 remedies have gone through clinical observation studies.

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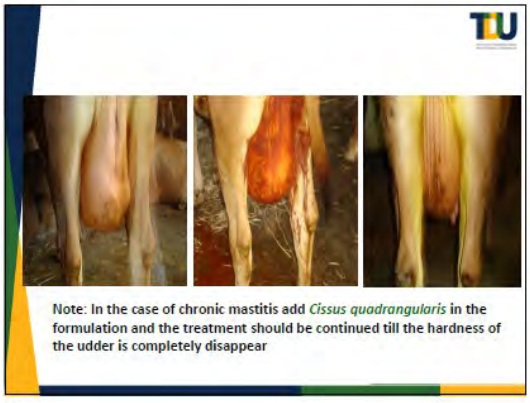

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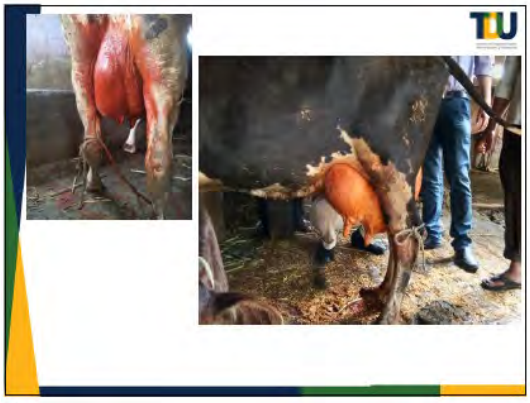

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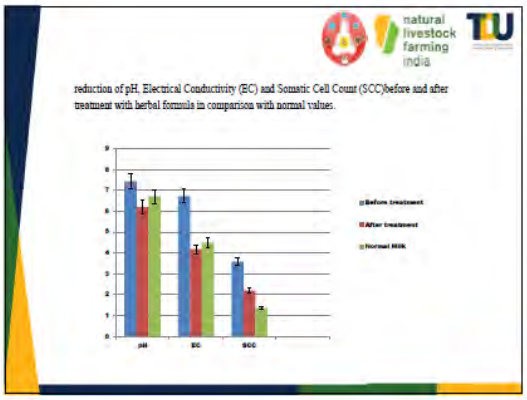

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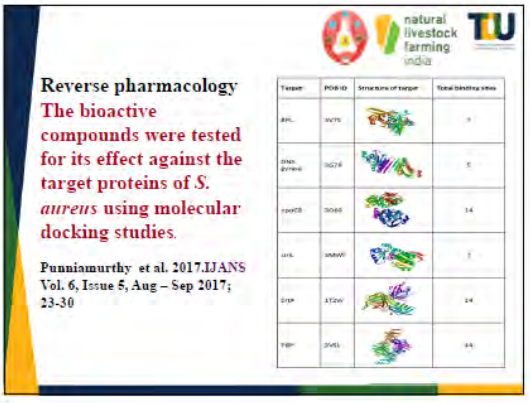

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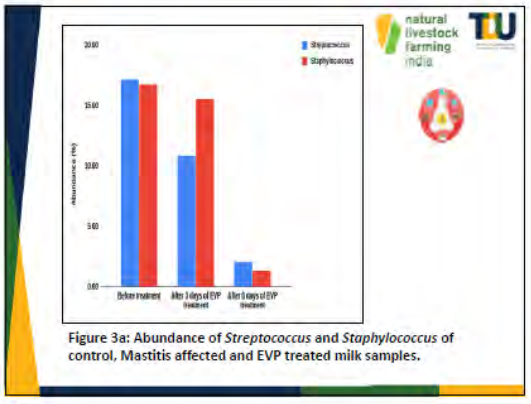

Figure 3a: Abundance of *Streptococcus* and *Staphylococcus* of control, Mastitis affected and EVP treated milk samples.

16

LSD




17

Bloat/indigestion



21

Fever













Warts/ Udder pox









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Data from NDDB

Information Network for Animal Productivity & Health (INAPH), an application that facilitates capturing of real time reliable data on Breeding, Nutrition and Health Services delivered at Farmer's Doorstep. It helps to asses and monitor progress of the projects.

https://www.nddb.coop/resources/inaph

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Metritis/ Repeat breeding

20

S No	Ailment	Total treated cases	Total clinical recovery	% clinical recovery
1	Fever	113172	94583	83.6
2	Diarrhoea	110046	93658	85.2
3	Acute Mastitis	104475	82878	79.3
4	Chronic mastitis	52791	41502	78.6
5	Indigestion	27358	22961	83.9
6	Sub-clinical Mastitis	23986	19780	82.5
7	Anoestrus	17617	13132	74.5
8	Blood in milk	15718	13269	84.4
9	Repeat breeder	13262	9017	68.0
10	Deworming	11916	10690	89.7
11	Udder oedema	9567	7993	83.5
12	Wound	6534	5339	81.7
13	Retention of placenta	5744	4094	71.3
14	Bloat	5220	3959	75.8
15	Ectoparasites/ticks	4164	3444	82.7
16	Teat obstruction	4030	2714	67.3
17	Endometritis	3770	3056	81.1
18	Agalactia	2721	2048	75.3
19	Downer	2720	1801	66.2
20	Wart	2573	1802	70.0
21	Lumpy Skin Disease	2258	1693	75.0
22	Swelling/ Joint Pains	1913	1424	74.4
23	Prolapse	1543	1052	68.2
24	Poisonige (unknown origin)	647	448	69.2
	Total EVM Treatment	543745	442337	81.4

Feedback from various milk societies from NDDB through INAPH * on the Efficacy of EVPs for 24 clinical conditions in cattle from 2017-18 to 2021-22

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EVP training in 14 states

1. Andhra Pradesh
2. Assam
3. Delhi
4. Gujarat
5. Haryana
6. Karnataka
7. Kerala
8. Maharashtra
9. Punjab
10. Sikkim
11. Tamil Nadu
12. Telangana
13. Utter Pradesh
14. West Bengal

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Antibiotic residue: Farmer's samples one year after intervention

MILK Union	Number of farmers	Antimicrobial residue Negative	residue Low Positive	Residue Positive
Allapra	15	12	2	1
Arakkapady	15	11	2	2
Chakkampuzha	10	10	0	0
Maneed	10	07	3	0
Manikyamangalam	15	12	2	1
Monippally	10	06	2	2
Puthrika	10	10	0	0
Sreemoolanagaram	15	15	0	0
Thirukanurpatti (TN)	20	20	0	0
Aralumallige (Karnataka)	20	20	0	0
	140	123	11	6
Per cent		87.86%	7.85%	4.29%

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Reduction of disease incidence from 2016 to 2019

Disease	Mastitis			Enteritis			Repeat breeding			Cowpox		
Year	2016	2018	2019	2016	2018	2019	2016	2018	2019	2016	2018	2019
Average incidence per union	66	37	11	11	7	4	9	3	1	3	2	0
Per cent reduction		44%	84%		35%	81%		71%	96%		11%	100%

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30

Average expenditure in Rupees for the treatment with Conventional medicine and EVP- the saving (1 USD = Rs.73.52 on 01/12/ 2020)

No	Disease conditions	n	western drug treatment	EVP treatment	Amount saved
1	Mastitis	35	3000	120	2880
2	Maggot wound	28	962.5	60	881.7
3	Bloat& Indigestion	34	719.4	224	495.4
4	Repeat breeding	23	3060.7	430	2630.9
5	Cow pox	18	583.3	335	250
6	Foot and Mouth Disease (FMD)	22	3165	1640	1525
7	Diarrhea	3	500	166	334

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Organizational garden - Milk Union

Aloe vera in grown by a farmer

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What India can share with others

- Train on documentation of local health tradition and resources
- Train stakeholders on use of herbal medicine on Livestock primary health care and reduce antimicrobial residue in the animal products
- Establish Home/institutional herbal gardens
- Pilots with herbal remedies

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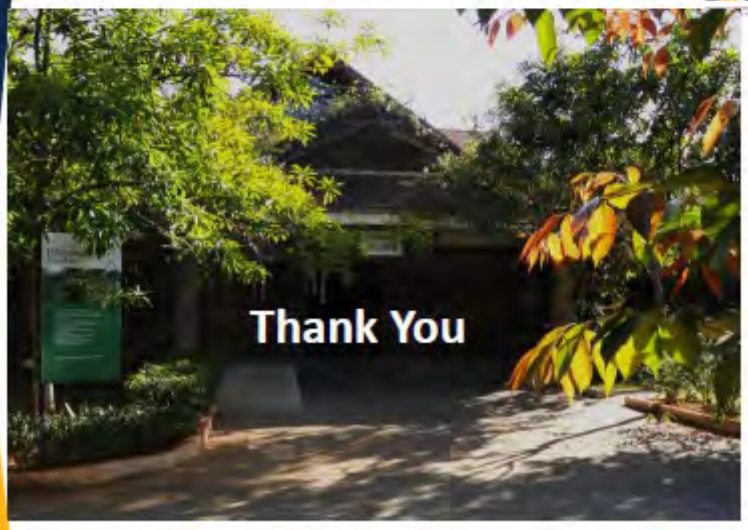
Training and capacity building of farmers and other stakeholders

33



34

Ms Veda Panohar

Panchamveda Organic Farm and Dairy
Veda Manohar

1

Towards ROOTS...

We have decided 10 years back to go back to our village

And

Practice agriculture, when we attain 50 years of age..

..We did the same.

2

Towards ROOTS...

- Yes,
- it was difficult to shift from our political and social background in Bangalore
- But ours decision was strong enough.
- Accordingly we shifted 9 years back to Guddadahatti village 250 km from Bangalore

3

Towards ROOTS...

- Our aim was to build an Organic farm with learning centre for those who interested in an organic way of living and farming.
- Our farm is situated in Chikkamaglore district the border of Bhadravthi and Tarikere Taluk

4

Towards Dairy...

- Obviously we followed the neighbour's way of cultivation initially.
- We cultivated sugarcane and paddy in open field. Banana as intercrop in the coconut plantation.
- But we didn't make the profit.
- The main expenditure goes to fertilisers, labours cost and cultivation equipment rentals
- Then we discussed with so many people and find the reason.
- Slowly we started organic farming, for this we need organic fertiliser.
- Then we started Dairy.

5

Towards organic..Dairy is an answer

- When we decided to start a dairy, naturally we make mind to adopt latest technology. Same time we thought of produce organic milk
- Yes, for organic farming, dairy is a essential part
- In the beginning we faced so many difficulties, every day we used to call Veterinary doctor and he was using heavy antibiotics to treat Cowes.
- This leads to other problems for us and cow also.

6

Experience..

- Past 8 years we are running a dairy
- Beginning it was restless work .
- We use to work 20 hours per day.
- lot of problems, like mastitis, foot rot, repeat breeding, for this we use to call veterinary doctors every time,

7

Experience..

- It will be more expensive and time consuming
- Then we thought of using alternative medicine .
- Started using Ethnoveterinary practices, Ayurveda and Homeopathy medicine

8

Learning Ethnoveterinary Practices (EVP) and veterinary Ayurveda..

EVP workshop at Panchamaveda on 17-08-2014 with Dr Punyamurthy and Dr Kumar

experience..

- we invited Ayurveda Doctors for work shop.
- Initially we felt preparation time is more compared to allopathic medicine.
- But once we started to use it was easy.

10

Experience with Ayurveda..

Now we are treating successfully for "mastitis, Foot Rot, Edema".

More than 50 cows treated till now

Without any Antibiotics

Now no mastitis in our dairy may be one or two per year.

11

TheCertificate

Animal and Fisheries Sciences University Karnataka conducted a test on Antibiotic and pesticide residues in our Milk

And it was found ZERO

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And it was found ZERO

Organic in true sense..

- Now we are free from Antibiotics residues
- Our milk is antibiotic, chemical and fertilizer free milk.. since more than 7 years

13

Dairy experience..

- According to me dairy design is also important for successful dairy .
- In our dairy no walls, it is a open and partially shed.
- Plenty of air and light.
- Paddock facility to walk and drinking water when its required.
- SAILEGE is necessary as food stock.
- We are making regularly around 70 ton of SAILEGE

14

Ethno veterinary practices in Panchamaveda

We are growing required medicinal plants organically in our farm

15

Medicinal plants and Products in our farm

Organically grown **Turmeric**

Organically grown **Ginger**

16

Medicinal plants and Products in our farm

Aloe vera

Cissus quadrangularis Adamant Creeper, Vajravalli (in sans)

***Ocimum sanctum*, Tulasi, basil**

17

Ethno veterinary practices in Panchamaveda

- Some treatments..
  - Mastitis
  - Fever
  - Edema
  - Foot rot
  - Indigestion

18

More natural....

Now we started our own breeding.
Now it recognize as f1 breed.
No artificial insemination.

9

Sharing the experience of EVP in Netherlands

22

Our dairy in news..


ವಿಜಯವಾಣಿ

0

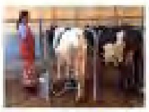
Take a look of .. Panchamaveda organic Dairy

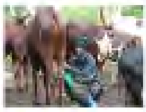
https://www.youtube.com/watch?v=[illegible]

Click for video clip

23

Sharing the experience of EVP in Netherlands





Green solutions for reducing antibiotics

International collaboration to promote natural ways of dairy farming

'Green Solutions for Reducing Antibiotics' will highlight the current state of knowledge of the international collaboration on Natural Livestock Farming in the Netherlands, India, Ethiopia

1

Thank you ALL

24

Ms Poongodi

1

2

3

4

Vermicomposting is another way of our organic farming activity

7

Umbalaicherry a native cattle – used for our organic farming

8

A traditional variety of paddy grown by us
The field is getting ready for harvest

9

Organic yam cultivation

Plaintain - banana

10

Manual de-weeding is in progress - lending my hand as well

Turmeric is a major crop in our region

11

Coconut Copra for virgin coconut oil ,is another organic product from our farm

Among our Coconut trees and the lush green foliage of organic turmeric

12

Organic Tapiaco- cassava- major crop for sago

13

I also grow vegetables organically

Egg plant – organic Brinjals

Organic Bitter guards

14

Green Fodder and dry fodder for our cross bred milch cows

15

Feeding cows personally is my passion :
They are my partners in organic farming

16

I personally attend the cows daily to ensure welfare and health of the cows

17

When animal is sick
Nursing the EVM way is the best way to keep an animal healthy

18

Animal health is taken care of by me with EVM only

Veterinary Doctor's help ..only for Artificial Insemination and Pregnancy diagnosis purposes

19

EVM for Mastitis with Aloe vera, Turmeric, chunna
The major success which enabled profit in dairying

20

EVM easily cures mastitis in 5 days time and mastitis is no issue for us since 15 yrs

21

The earlier version of EVM herbal recipe of Dr.Punniamurthy for FMD was used and tested by me way back in 2011

Later in 2013 EVP for FMD was fine tuned

22

Fresh herbals in the treatment of a fractured and infected hind limb in a heifer

- *Basil* (*Ocimum basilicum*), Indian Nettle (*Acalypha indica*), Garlic (*Allium sativum*), Turmeric (*Curcuma longa*) and *Centella asiatica* in coconut oil and
- *Devil's backbone* (*Cissus quadrangularis*) orally for 14 days

23

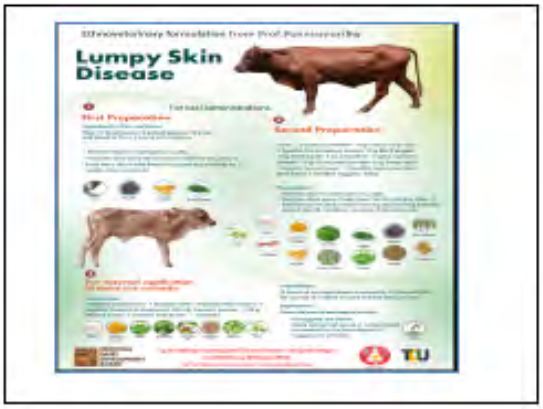
Neem leaves, turmeric in Gingili oil helped goats and kids recover from "Sore mouth disease"

24

25

26

27



28

29

30

Annual Harvest festival and thanks giving to cattle in the month of January – a family fest

31

Pongal -Harvest -Festival celebrating with Family and Friends

32

Relaxing Times after Tough farming activities

Leisure trips with family to a few domestic destinations

Visited Some European countries in 2016 and

Singapore, Thailand etc in 2019

33

34

35

36


Goteberg ,Sweden 2016

37

38

39


Singapore Zoo
I am a farmer, hence I feel at ease whether I am in the EAST or the WEST or at a ZOO, for that matter.

40


Thank you ,bye

41

Ottathaikkal Farm

Lakshmi G
2/388 MLA Road Puthiyakavu Udayamperoor Ernakulam 682309 ,
Ph :9847050057,
D&O License No: CI 583/19-20 Farm License No : CI-540 /18-19
Food safety and standard act of India -: (FSSAI)
Reg. No. 21319186000214


1

Ottathaikkal Farm

2

Background

- After 10 years of life in flats in cities, in 2014 moved to our ancestral home in Puthiyakavu, Tripunithura Kerala state
- The Initial plan was only to stay & maintain the house
- Eventually started developing a garden & watch dogs
- Later added poultry varieties & added a cow & goat
- Gradually the number of cows kept increasing & the calves were also grown in house
- Till 2018 dairying was taken primarily as an engagement without profit

3

Ottathaikkal Farm

- There was a demand for pure milk and milk product
- Therefore we Registered a Farm entitled Ottathaikkal Farm & took Fssai / Packing & other statutory licenses.
- Presently, milk & milk products like Curd / Paneer/ Butter Milk / Butter & Cow Ghee was produced and sold from home
- The farm has now 14 Cows & 3 Goats as part of dairy
- We also developed automation for milking , washing, cream separation etc.

4

Challenges

- Non availability of the good veterinary services even at emergency
- The service was largely rendered by a retired Live Stock Assistant as availability of veterinary doctors was difficult
- Lack of good quality semen and irrational insemination & success rate was very poor
- Challenge for keeping the quality of milk and customer satisfaction

5

Alternate option

- Mean time we have attended a training programme on the preparation and application of Ethno-veterinary practice to reduce antibiotics and other chemical veterinary drugs
- This programme was supported by Department of science and Technology Government of India conducted by Dr. M.N Balakrishnan Nair, P.K Narayana Kaimal & Abhilash Raju at Manikkamangalam Milk Society

6

Alternate option

- The Secretary Manikkamangalam Milk Society introduced Abhilash Raju who is part of the Ethno-veterinary team
- Abhilash Raju trained us and extended his service of to familiarize Ethno- veterinary herbal treatment in our farm
- Abilash Raju also an expert in artificial insemination and trained Ethno-veterinarian.

7

Ethno-veterinary Practices

- Last 2 years along with Mr. Abhilash we had corrected repeat breeding and he assisted Pregnancy diagnosis and other clinical conditions of cattle.
- We are now able to manage FMD, Repeat breeding, Diarrhoea, Ana plasma, Theileriases and lumpy skin Disease (LSD).
- I have a small area for growing herbal plants, rice and vegetables

8

The medicinal plants

- Many of the ingredients of Ethno-veterinary formulations are present in the kitchen (Turmeric, cumin, coriander, fenugreek, asafoetida, onion, garlic, ginger, coconut oil, Sesamum oil).
- I grow few medicinal plants like *Aloe vera, Curcuma longa, Mimosa pudica, Zingiber officinale, Ocimum sanctum* and fodder grass
- Rest them like *Andrographis paniculata* we out source
- By using EVP our health expenditure has came down substantially and we are able to manage the health of our livestock more effectively

9

Aloe vera | *Zingiber officinale* Ginger | *Curcuma longa* Turmeric

10

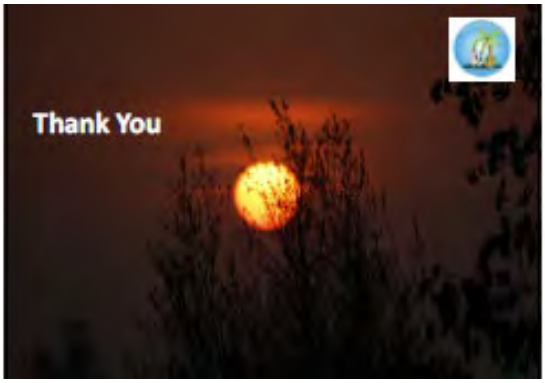
Ocimum sanctum Basil | *Mimosa pudica* Touch me not | Fodder grass

11

Future Plans

- Get the milk and milk products tested for antibiotic residue
- Want to provide a residue free certified milk and the milk products to the consumers
- Learn more EVP for other clinical conditions and use them even for prevention of diseases

12



Dr. Jan-Paul Wagenaar

1

2

Louis Bolk Instituut

Multi-species pasture for grazing, October 2021,

resown summer 2021 (sandy soil)

3

Louis Bolk

5

Multi-species pasture for grazing, October 2021,

3 years old pasture, same farm

4

6

Louis Bolk Instituut

Good results with reseeding and overseeding

7

Louis Bolk Instituut

Herbs, multi-species pastures, are popular with Dutch Dairy farmers . . . . . .

Two decades of small scale experimentation and demo's did not result in adaptation, but . . . . . .

1. Promoting pasture herbs to improve BIODIVERSITY,
2. Promoting pasture herbs to improve SOIL QUALITY,
3. Three DRY summers (2018-2020) and climate debate,
4. FINANCIAL REWARDS form Dairy Industry (Royal Friesland Campina, AWARE, etc.),
5. Public appreciation and initiatives of NGO's to provide farmers with subsidized seed . . . .

. . . . . resulted in 1000's of hectares of pastures with productive herbs-grass mixtures.

8

Louis Bolk Instituut

Productive & Natural herbal pastures

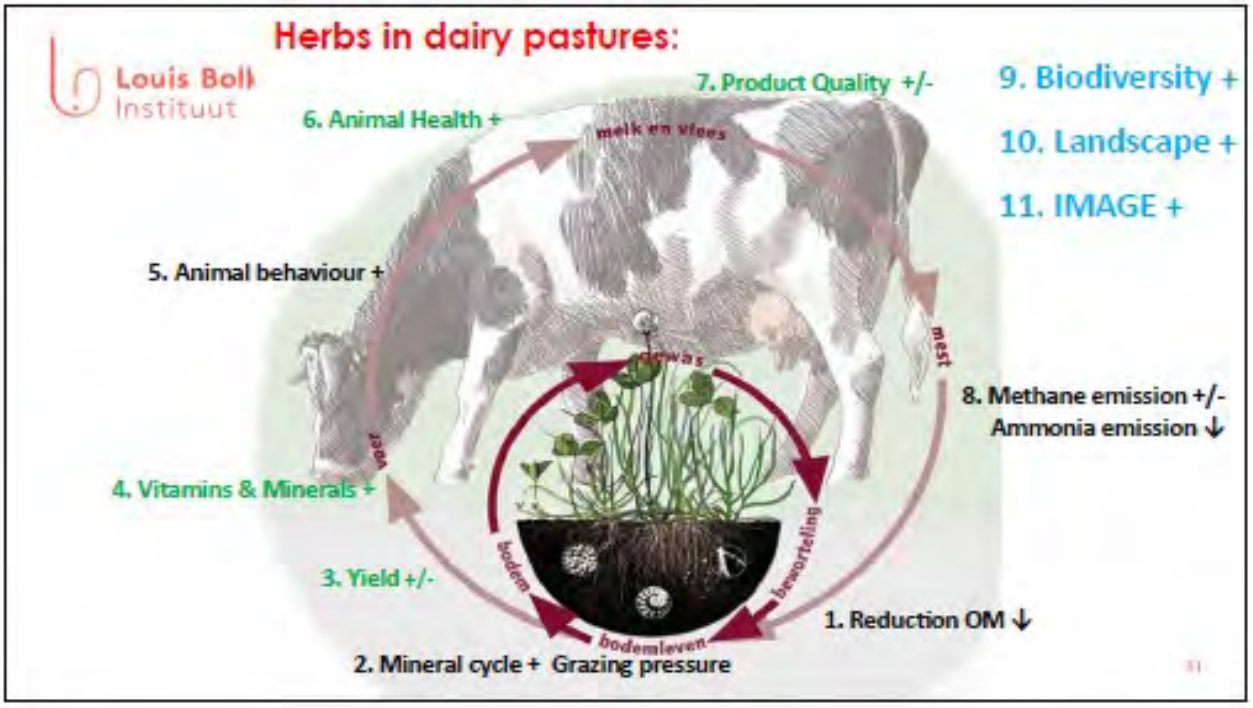
Productive **Natural**

Louis Bolk Instituut

Four persistent questions . . . . . .

1. What do you mean with 'multi-species pastures'?
2. How do I keep herb species in my pastures?
3. How do herbs fit in my farm / farming system?
4. Are multi-species pasture economically viable?

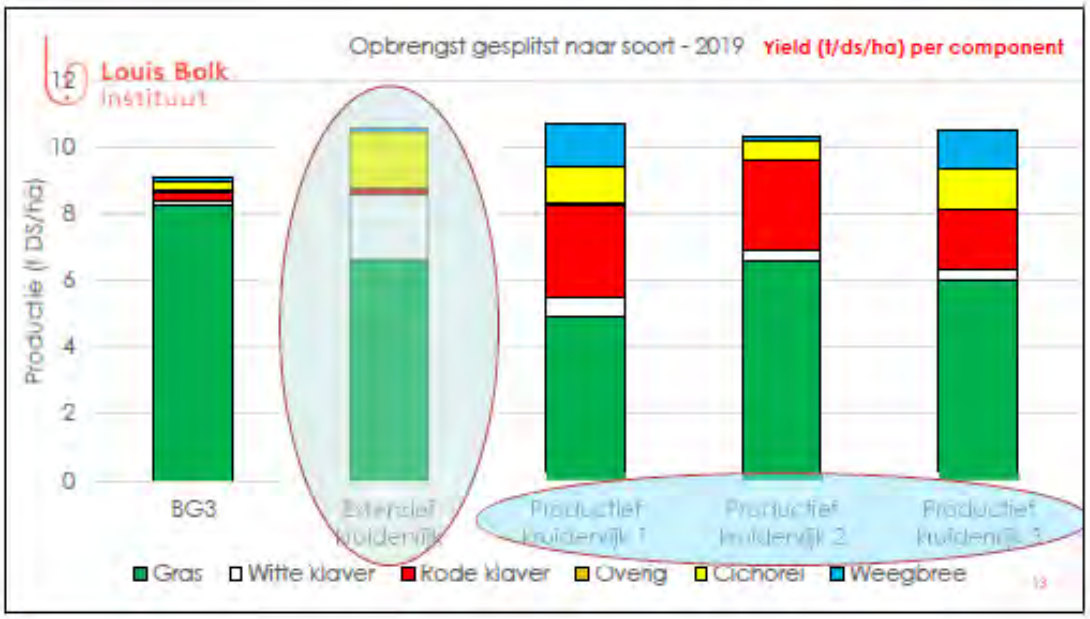
9


Herbs in dairy pastures:
Louis Bolk Instituut
7. Product Quality +/-
6. Animal Health +
9. Biodiversity +
10. Landscape +
11. IMAGE +
melk en vlees
5. Animal behaviour +
mest
gewas
8. Methane emission +/-
Ammonia emission ↓
voer
4. Vitamins & Minerals +
bodem
bemesting
3. Yield +/-
1. Reduction OM ↓
bodemleven
2. Mineral cycle + Grazing pressure

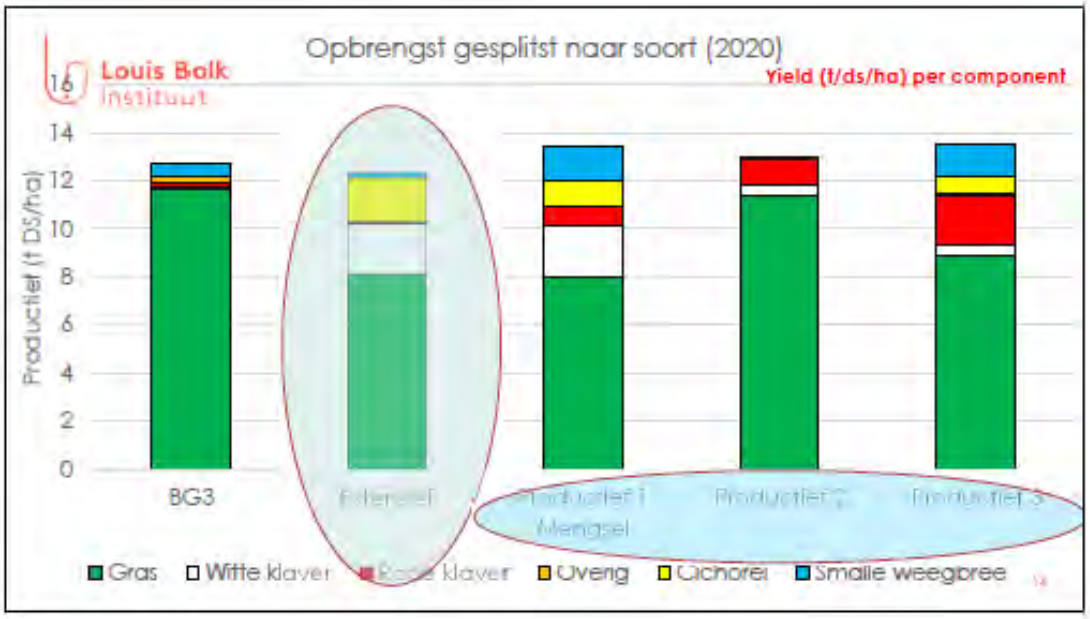
11


Louis Bolk Instituut
Trial: Kelpen-Oler, Province of Limburg, 2018 - 2022
Sandy loam
Source: POPS – 'soorterijk grasland limburg' 2018

12


Louis Bolk Instituut
Opbrengst gesplitst naar soort - 2019
Yield (t/ds/ha) per component
Productie (t DS/ha)
0
2
4
6
8
10
12
BG3
Extensief kruidenrijk
Productief kruidenrijk 1
Productief kruidenrijk 2
Productief kruidenrijk 3
Gras
Witte klaver
Rode klaver
Ovveng
Cichorei
Weegbree

13


Louis Bolk Instituut
Opbrengst gesplitst naar soort (2020)
Yield (t/ds/ha) per component
Productief (t DS/ha)
0
2
4
6
8
10
12
14
16
BG3
Extensief
Productief 1 Mengsel
Productief 2
Productief 3
Gras
Witte klaver
Rode klaver
Ovveng
Cichorei
Smalle weegbree

14

Louis Bolk Instituut

2019 – average feeding value (fresh product)

Mixture	Crude protein	Energy				Crude Fiber
Mengsel	**Ruw eiwit %**	**DVE**	**VEM**	**Cu (mg/kg)**	**Zn (mg/kg)**	**Ruwe Celstof**
BG3	16,1	76	929	7,4	38	161
Extensief	18,1	79	941	10,4	66	181
Productief 1	18,1	80	947	11,6	74	181
Productief 2	18,0	80	937	9,5	50	180
Productief 3	17,0	77	945	11,5	71	170

15

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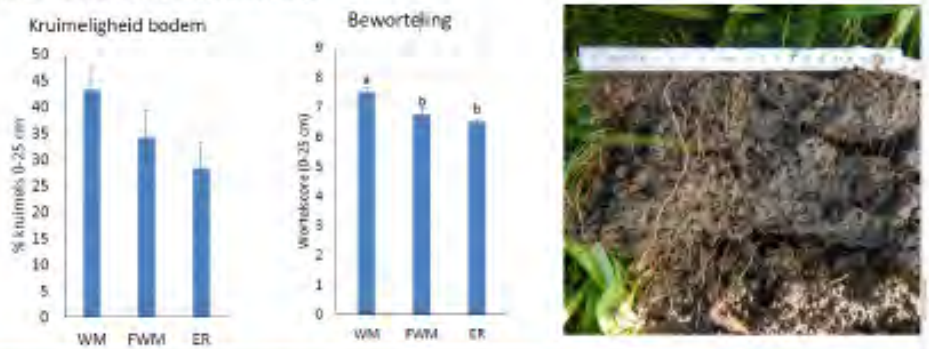
Soil structure (left) and Root score (right)

Bodemstructuur en beworteling



- Weidevogelmengsel (WM) kruimeligere bodem en betere doorworteling van de bovengrond

WM = natural herbs/grass mixture FWM = pred. Functional herbs/grass mixture ER = English rye grass

16

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Biodiversity: common herbs can contribute to presence and survival of bees and insects

Field thistle

Caraway

white clover

dandelion

chickweed

soort	jan	feb	mrt	april	mei	juni	juli	aug	sept	okt	nov	dec	kwaliteit
Klaver wit					5	5	5	5	5	5			N+S, P
Vogelmuur	3	3	3	3	3	3	3	3	3	3	3	3	n+s, P

Continuous **pollen (S)** availability is an important lifeline for insects, **Nectar (N)** fuel for flying, feed for larvae and winter supplies P period

17

17

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Demonstration Eesveen, Province of Overijssel, 2018-2020

Source: POPS – 'Knoflige Kruiden', Overijssel, March 2018

sandy soil with high most content

Source: POPS – 'Knoflige Kruiden' Overijssel mid Juli 2018

18

Louis Bolk Instituut

Demonstration Eesveen, Province of Overijssel, 2018-2020

sandy soil with relative high most content

19

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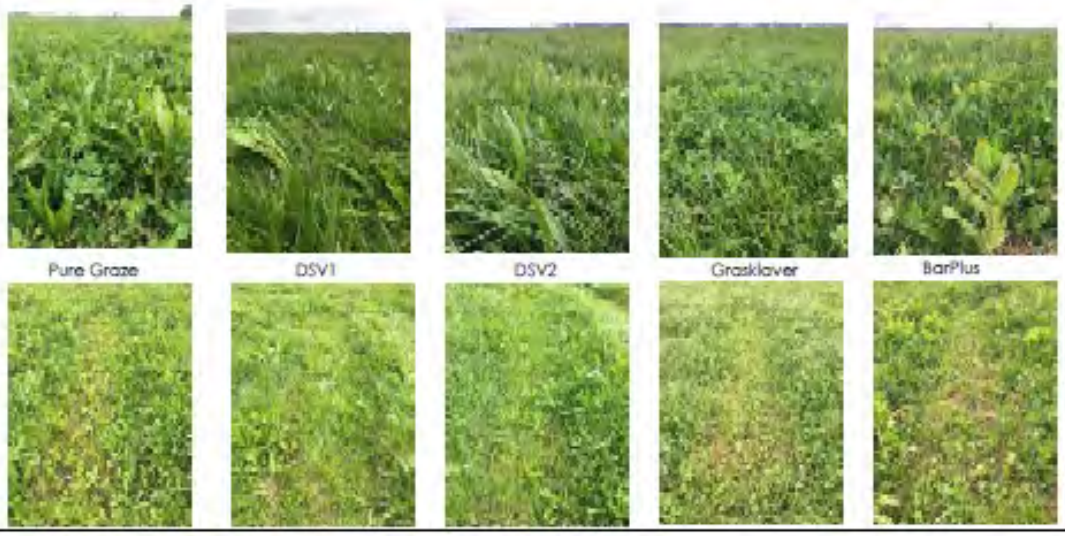
Demonstration Eesveen, Province of Overijssel, 2018-2020



20

20

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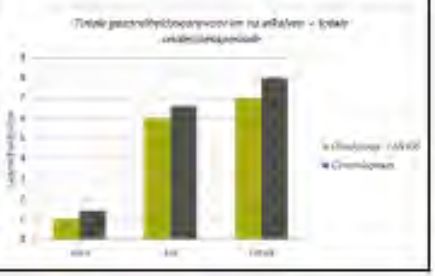
Protocol: clinical scoring of cows grazing in multi-species (herbs) – grazing grass pastures

Parameter	Gezond (waarde = 0)	Afwijkend (waarde = 1)
Neus vies	Nee	Ja
Ademhaling afwijkend	Nee	Ja
Pathologische venepols	Nee	Ja
Oren koud	Nee	Ja
Temperatuur	>37,5 & <39,5	≥39,5
Ademhaling afwijkend	Nee	Ja
Bukvulling zichtbaar	Ja	Nee
Pensscore	Scores 3,4 en 5	Score 1 altijd & score 2 alleen i.c.m. slappe inhoud
Slappe inhoud	Nee	Ja = 1
Pensbewegingen (15 min)	Tussen de 15 en 45	< 15 & > 45
Uier zucht	Nee	Ja
Uier afwijkend aanvoelend	Nee	Ja
Uier rood	Nee	Ja
Locomotie score	Scores 1,2,3 en 4, indien koe niet kreupel is	Score 5 of score 1,2,3,4 i.c.m. kreupelheid
Kreupel	Nee	Ja
Ziek	Nee	Ja

Healthy | Sub-optimal health

Observations (weekly)
1-2 weeks before calving till
8 weeks after calving

No hard results:
Groups too small!



21

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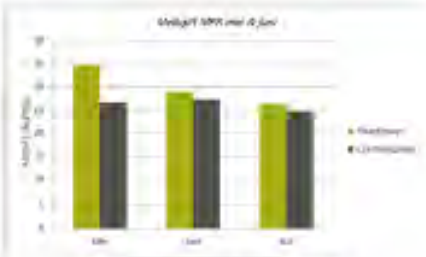
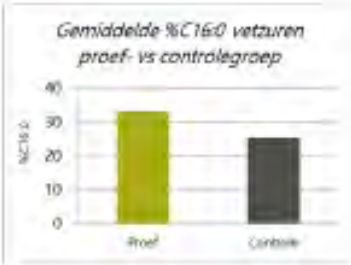
Milk Production and Milk Quality



Milk production

Milk Fat and Protein



Fatty acids

Few si

22

Louis Bolk Instituut

Selective grazing of herbs?

Cows:

- just after calving?
- Ketosis
- Rumen acidosis?

Prefer herbs?

23

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What's next with pasture herbs?

1. Herbs are a <u>suitable tool</u> to initiate a system change:
   soil oriented – low fertilizer – attractive production under 'extreme' conditions!
   → **more education, farm learning & experimenting towards sustainable farming**

2. It is not a single 'advantage' which makes pasture herbs work:
   The **accumulated benefits** of all aspects make the difference!

3. **There is more than pasture herbs!**
   Sometimes it is wiser to go for grass or to **refrain from tillage at all** and embrace old (in age) pastures with 'natural' botanical composition, etc.

!

24

Hans Nij Bijvank DVM

This presentation:

- Inspiration:
  - Visit to India and principles of ayurveda
  - Farmers who work with herb-rich, multi species pastures
- Secundary metabolites in herbs
- Multispecies pastures
- Do herbivores need secondary metabolites to stay healthy?

The use of herbs on Dutch dairy farms nowadays:

- The **interest** is growing:
- Mainly for cow health: giving the cow more diversity
- Also for improving soil

- Main **concerns**:
- Will I get enough dry matter per hectare? >10.000 kg dm/hectare
- Costs and persistence of the herbs

Visit to India with farmers and veterinarians in 2014, 2017

Goal: less use of antibiotics in both countries

Possibilities Ayurveda

- **Treatment clinical mastitis:**
- curcuma (geelwortel) met aloë vera blad
- 10 keer daags
- uittrekken, wassen met warm water en dan op uier aanbrengen

- Goede **klinische** genezing; geen bo of celgetal

Possibilities Ayurveda

- **Calf-diarrhoea**
- Pasta maken met o.a. komijnzaad, peper, fenegriek, maanzaad, kurkuma, asafoetida en knoflook en ui
- In stroop
- Eenmalig ingeven
- opname deels via mondslijmvlies

Principles Ayurveda

- Aim is to get balance, aim is not to kill bacteria
- Use whole parts of plants, not 1 component/molecule
- Fresh better than conserved
- Local plants better than from far away

Situation in the Netherlands:

- Nederland is: “completely gone chemical”
- (dr Punniamurthy)

- No botanical knowledge in veterinary
- school

- Old veterinary knowledge (< 1940) completely forgotten

“Single molecule treatment is not natural”

How can we use these principles in the dutch dairy farms?

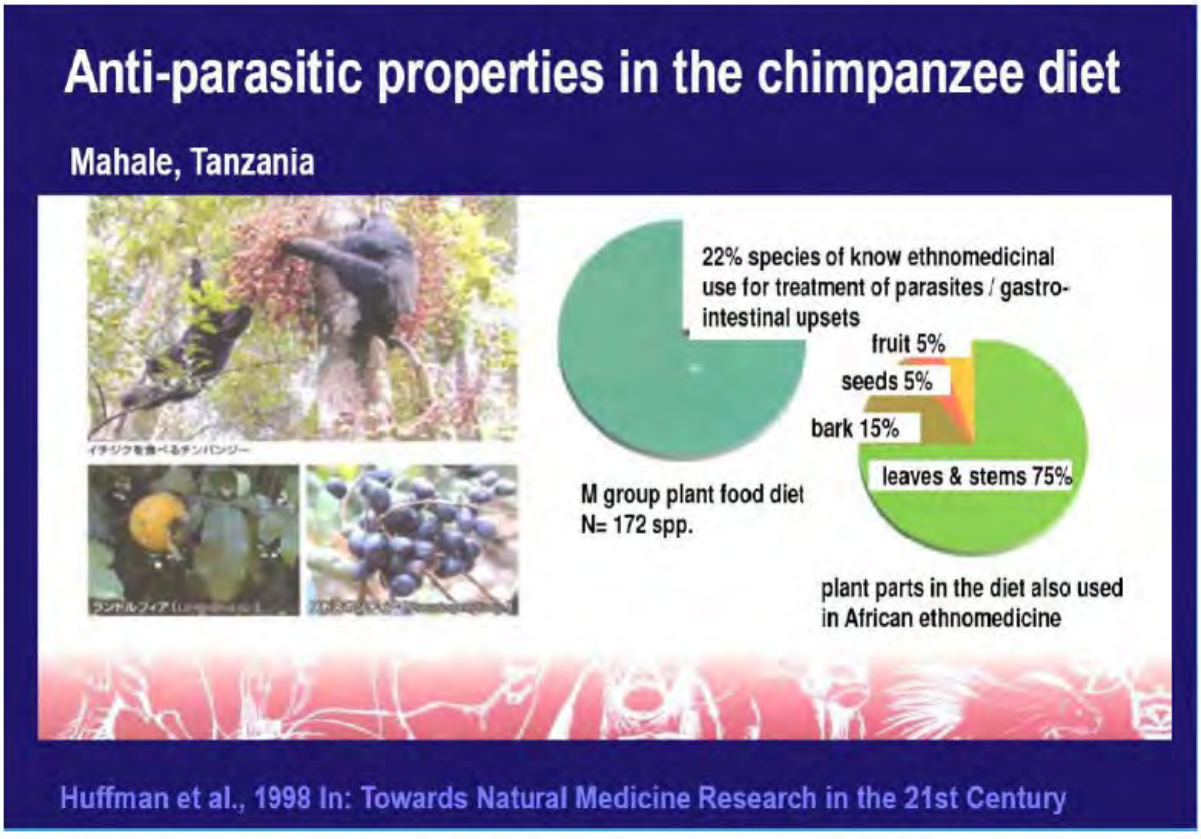
- Seek more balance in the animal and the microbiome of the soil, the intestines and the udder
- Don’t treat with single molecules (antibiotics)
- Which local plants are useful? (in the pasture)

What is the variation of species of plants fed to dairy cows?

- Grass
- Corn
- Soy hulls
- Rape seed
- Clover
- Alfalfa
- FodderBeets

What is the variation of species of plants in the diet of wild animals?

- chimpansees
- Galloway-cows in dutch nature: de Millingerwaard



Tabel: Planten waarvan meerdere keren de consumptie door de Galloways is waargenomen.

Plantenfamilies	Nederlandse benaming	Latijnse benaming
Composieten	Akkerdistel	*Cirsium arvense*
	Boerenwormkruid	*Chrysanthemum vulgare*
	Duizendblad	*Achillea millefolium*
	Echte kamille	*Matricaria recutita*
	Grote klis	*Arctium lappa*
	Klein hoefblad	*Tussilago farfara*
	Paardebloem	*Taraxacum officinale*
Kruisbloemen	Koolsoort	*Brassica sp*
	Herderstasje	*Capsella bursa-pastoris*
Rozen	Vijfvingerkruid	*Potentilla repens*
	Zwarte Braam	*Rubus fruticosus*
Lipbloemen	Hondsdraf	*Glechoma hederacea*
	Paarse dovenetel	*Lamium purpureum*
Ranonkels	Kruipende boterbloem	*Ranunculus repens*
	Speenkruid	*Ranunculus ficaria*
Overig (familie)	Brandnetel (Brandnetel)	*Urtica dioica*
	Kleefkruid (Sterbladige)	*Galium aparine*
	Ridderzuring (Duizendknoop)	*Rumex obtusifolius*
	Smalle weegbree (Weegbree)	*Plantago lanceolata*
	Smeerwortel (Ruwbladige)	*Symphytum officinale*
	Vogelmuur (Anjer)	*Stellaria media*
	Witte klaver (Vlinderbloemen)	*Trifolium repens*
	Zachte Ooievaarsbek (Ooievaarsbek)	*Geranium molle*
Bomen en heesters	Gewone Vlier (Kamperfoelie)	*Sambucus nigra*
	Schietwilg (Wilgen)	*Salix alba*

Fred Provenza

- -Herbivores eat 50-75 different species of plants per day, of which 3-5 species form the bulk of the diet.
- -The rest is consumed for health benefits

Smalle Weegbree (plantago lanceolata)

secundary metabolites in Plantago:

- **Aucubine**: mildly antimicrobial, laxating, anti-inflammatory, liver-protective, anti-oxydant
- **Acteoside**:mildly antimicrobial (urogenital infections), anti-fungus, anti-oxydant, blood-pressure regulant
- **Tannins** (protein-digestion rumen, anti-parasite).
- **Mucilage**; polysacharide; gel-forming)

- *Proceedings of the New Zealand Grassland Association 58: 77–86 (1996)* **77**

- **Plantain (*Plantago lanceolata*) – a potential pasture species**

- A.V. STEWART
- *Pyne Gould Guinness Ltd, PO Box 3100, Christchurch*

Tannins

- Effect on protein digestion in rumen:

- Complexforming with free protein in rumen: digestion slowed down and changed to intestianal digestion (eg. Lotus corniculatus)
- Less loss of protein to ammonia
- Methane-production lower (Esparcette (Onobrychis viciifolia))

Exploitation of dietary tannines to improve rumen metabolism and ruminant nutrition, Amlan K, Patra, 2010

Paardenbloem (Taraxacum officinale)

- ✓ Bitter taste, stimulates saliva and digestion, flavonoïds, high in potassium, magnesium, selenium, cobalt
- ✓ Supports liverfunction
- ✓ Resistant to drought (taproot)

Cichorei (Cichorium intybus)

Ingredients Cichory

-minerals

high Potassium, Calcium, Zn, Copper, Phosfor

-good energy and protein content

-secundary metabolites:

tannin

lactucin, lactupicrin and 8-deoxylactucin

chicoriin (coumarin), chicoric acid (caffeinezuur derivaat)

Literatuur:

Insuline/glucose metabolism, antiviral, anti-inflammatory, liverprotective

Research Ireland sheep and lamb performance on multispecies

Grace C. et al, 2018

Grazing multispecies swards improves ewe and lamb performance

results

- -ewes on multispecies maintained their weight during suckling period and ewes on grass monoculture pasture lost 4/5 kg weight
- -after 6 weeks the lambs on multispecies had average 1-2 kg more weight
- -growth till slaughter was 10% higher on multispecies versus grass

results

- Production of dry matter feed of the multispecies fields were the same as the monoculture fields with less Nitrogen per hectare: 90 kg N per hectare vs. 163 kg N per hectare
- De-wurming of the lambs :average 1.5 time vs 2.7 time

Commercial multispecies herb-mix for farmers: salad buffet

70% Grasses

Perennial ryegrass, timothee (Phleum pratense), rietzwenk (Festuca arundinacea) , kropaar (Dactylis glomerata)

15% Clovers: *esparcette (Onobrychis viciifolia), red clover, white clover, witte weideklaver (trifolium repens), bastaardklaver Trifolium hybridum) , rolklaver (Lotus corniculatus), gele zoete honingklaver (Mellilotus officinalis)*

15% Kruiden:

cichory, pimpernel (Sanguisorba minor), duizendblad (Achille millefolium), Parsley (Petroselinum crispum), Plantago lanceolata

Thanks for your attention!