Sharing models for improving human nutrition and incomes through effective livestock research and extension partnerships – Case studies

Doj Raj Khanal, PhD Senior Scientist (S-4) Nepal Agricultural Research Council, Kathmandu

Outline of the presentation

- Impact of pure Boer and Saanen goat research and extension
- Research on Khari disease management: Example of research-extension collaboration
- Dairy cattle improvement project (DCIP)
- Re-defining Indigenous Knowledge on most neglected supplement feed to livestock and poultry

Historic Initiative of Boer goat introduction by NARC (2008)



Impact of Boer and Saanen Goats

 Import of pure Boer from Australia 2015 (100%)

• ~: 10 • : 40 Total **50**

2017 (100%) 36 38 Total **74**

(12 single, 28 twinning and 2 triplet)

 Import of pure Saanen from USA 2015 (100%) 2017 (100%) • ੋ:15 11 • 2:20 4 Total 35

Total **15** (7 single and 4 twinning)

Production and distribution of goats from GRS (NARC), Bandipur & its Resource Centres

Production & distribution	Breeds	Year 2070/71 (2013/14)	2071/72 (2014/15)	2072/73 (2015/16)	2073/74 (2016/17)	2074/75 (2017/18)	2075/76 (2018/19) 8 months	Total
Production from	Pure Boer			38	74	58	51	221
Station	Boer crosses	60	80	103	126	176	113	658
Production from Resource centre	Boer crosses	250	385	525	437	411	333	2341
Distribution from Station	Boer crosses	88	144	121	136	144	85	718
Distribution from Resource centre	Boer crosses	890	660	719	779	520	240	3808

Source: Raju Kandel, GRS, Bandipur

Dairy Cattle Improvement Project (DCIP)

- Currently being implemented in 6 districts (started with 14 districts earlier).
- Data recording by Animal Breeding Division of NARC and selection and identification by DLS.
- Good example of collaboration between NARC and DLS.
- Full data analysis is yet to be done.

Enhancement of conception rate in dairy animals



 Tris based semen dilutor enhanced conception rate from 25% to 49% in buffaloes and from 48% to 54% in cattle.

III. Khari disease syndrome in Buffaloes





- **Ranked as a priority disease by DLS**
- Multiple causes: malnutrition, parasitic infestations, selenium toxicity, higher radiation, plant toxicity and defective stall management as the contributing factors acting in a concerted manner.

Penta sulfates (mixture of Cobalt, Copper, Zinc, Ferrous and Magnesium) @ 30-45 gm per animal for 30-45 days in the winter showed recovery in 70% of affected buffaloes.

• Massive up scaling is needed to prevent early culling and sustainable rural livelihoods.

टेलिफोन नं. ५५५१८५५

भैलीलाई खवाउन नहुने बौझ



मिलाउने र सकेमा २-४ घण्टा चराउन लैजाने / ४. परम्परागत सोचाईमा परिवर्तन ल्याई उच्च पहाडी भेगमा पाईने बाँझ भैसीलाई खुवाउनुको सट्टा बास्प्रालाई खुवाउने र भैसीको लागि टॉकि , काप्रो , मिमल र बडहर जस्ता डाले घाँसहरू र जैं, भेच , नेपिएर , स्टाइलो जस्ता भुँई घाँसहरू ब्यापक रूपमा ख़ुवाउन प्रोत्साहन गर्ने / धप जानकारीको लागि सम्पर्क ठेगाना:-नेपाल कृषि अनुसन्धान परिषद

पशु स्वारुष्टय अनुसन्धान महाशाखा

खुमलटार, ललितपुर

पेन्टासल्फेट र नाग्लेको औषधी खनाएर निको भएको भैसी



२. परजीवि नियन्त्रणको व्यवस्थावन (Management of parasites):- प्रत्येक साल चैत्र/ बैशाख र असोज/ कार्तिकमा नाम्ले र जुका विरुद्ध अक्सिक्लोजानाइड र लिभामिसोल नामको औषधीहरु जि. प.से. का./ सेवा केन्द्र / उपकेन्द्रमा सम्पर्क राखि निर्वामत रूपमा खुवाउने / यसको साथै दुधालु भैसीमा आई -भरमेक्टिनको प्रयोगलाई निरूत्साहित गर्ने /

३. गोठको व्यवस्थापन (Management of Shed):- नेपालको पूर्वि र मध्य पहाडी क्षेत्रहरूमा जस्तै दोहोरो हावा खेले गोठमा भेंसी रारूने व्यवस्था



9. कुपोषण (Malnutrition) हुन नदिन प्रत्येक दुघालु भैसीहरूलाई दैनिक २-३ के.जी.संतुलित दाना वा घरमा नै पाईने मकैको पिठो,गहुँको चोकर, पीना, हड्डिको धुलो ईत्यादि उपयोग गरी तयार पारिएको प्रोटिन, खनिज र भिटामिनयुक्त शक्तिबर्धक दाना (दालो) खुवाउने/ यसको साथै हरेक हिउँदमा एक-डेढ महिनासम्म दैनिक 9 पस्यों (३०-४० ग्राम) का दरले पेन्टासल्फेट नामको खनिज मित्रण सल्पर/वलो/सोलानीमा मिसाएर खुवाउने/



Inspiration from the indigenous communities

- Indigenous communities are responsible for substantial contribution of to the modern science.
- Scientists around the globe are learning from indigenous communities.
- Stinging nettle has been consumed by indigenous people esp. hilly ethnic races since time immemorial (popular among brave Gurkha warriors and their families).
- Visit to Basantpur, Terathum during 2005 May has inspired me to add some sort of science into stinging nettle.



Agri Res. Station, Pakhribas



Nettle (Sisno) supplementation for health and productivity





Preparation steps





Nettle preparation being ready









Treatment group

(Pen 10)





Feed: 120 gm/bird (100% commercial ration) Feed: 105.6 gm/bird + 14.4 gm nettle preparation (88% ration +12% nettle)

Age: 24 weeks

I. Egg laying performance in two groups





Egg laying performance (38%)



No. of eggs laid



II. Trend of body weight changes in two groups of pigs (N =6) fed 30 % Sisno (Treatment) and Normal Feed (Control)





Treatment: more shining

Control

Gross appearance of carcass



Control

Treatment: More compact musculature

Proximate analysis of pork

	% Fat	% Protein
Control	37	23.48 ± 5.87
Treatment	39.8	26.26 ± 4.97



III. Pilot study in broiler breeders (Cob500, n=760) at declining phase of productivity (47 weeks onwards: 398 eggs more) supplemented weekly once @ 5% level

Groups	Treatment	Control
Total	180	180
Infertile	12	18
Unhatched	32	32
Hatched	136	130
% Hatchability	75.56	72.22



IV. Pilot study in New Hampshire breeds at 45 weeks of age









Continued investigations

- Dairy cattle @ 20-40 gm/day
- Study in Kolkata at 0, 50, 100, 150 and 200 mg/Kg level
- Sheep and goat
- Trout fish
- Laboratory analysis at The University of Queensland revealed high levels of polyphenols in samples taken from Gorkha, Nepal.

VI. Effect on milk quality



Price in Health Food (WholeFoods) market





http://www.gaiagarden.com/products/nettle/10265

Fresh Dried Nettle \$50.12/lb

Quantity 50 ml.(1.7 fl oz) 1000 ml.(33.8 fl oz) **USD Price** \$11.70 \$122.40

Powder in Nepal: 5-6\$/Kg

Levels of Polyphenols

Sample	Country of origin and	Polyphenols
Number	code	mg/Kg
1	Nepal, UD1G	7800
2	Nepal, UD2L	2154
3	Australia, UU1P	6650



Summary

- Broiler can be supplemented up to 0.7% nettle powders daily or 3-5% nettle powders weekly with positive growth performance and higher levels of antibody titer against Ranikhet Disease.
- Laying performance can also be enhanced with weekly once supplementation besides giving eggs with higher shell thickness with appealing egg yolk even during prolonged storage.
- Nettle supplementation has reportedly been adopted by poultry farmers secretly due to its health benefits.
- Nettle supplementation in other food animals is also equally beneficial especially in hills and mountains where grains are less for human consumption while nettle goes wasted.
- Nettle powder is gaining market niches slowly in Kathmandu and Pokhara for human consumption.

What next ?

- More detailed studies on phytochemical analyses of nettle samples from different geographic locations, seasons and stages of growth in terms of polyphenols levels.
- Microarray/nutrigenomic studies in the advanced laboratories before and after nettle supplementation to decipher its role in immune enhancement.
- Cytokine measurements for immunomodulating properties
- Amino acid analyses in carcasses obtained from nettle supplemented animals







Strategic parasite control

- Oxyclozanide @ 10-15 mg per kg body weight in cattle and Triclabendazole @12 mg/ kg
 BW in buffalo twice during February/March and August/September found highly effective for the control of Liver fluke.
 - Pyrantel pamoate @ 25 mg/Kg BW found
 most effective in controlling the round worms
 of calves. Fenbendazole, Mebendazole and
 Ivermectin are also found effective against
 roundworms in calves.

Sheep and goat



- Kumri disease (microfilaria of Seteria) control in goats: Diethyl carbamazine citrate @100mg tab Once Daily for 3-5 days.
- For prevention: protect from mosquitoes and administer
 Diethyl carbamazine citrate
 @ 100 mg tab. from mid July to mid November once a month.

Swine

Different species of

endoparasites identified, epidemiology studied and double drenching with albendazole 25 mg /kg body weight in June and August) recommended for the control of endoparasitic diseases of pigs.





- Mastitis is a serious problem in high yielding dairy animals with a prevalence of 10-35%.
- Teat dipping with Povidone Iodine and 10% Glycerol (9:1) after milking of dairy cattle for 30 seconds in all quarters effective in controlling subclinical mastitis.
- Up scaling with complete package of deworming, teat dipping and mineral and vitamin supplementation needed to enhance the productivity.