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

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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%)  2017 (100%)
  • ♂: 10  36
  • ♀: 40  38
  Total 50  Total 74
  (12 single, 28 twinning and 2 triplet)

• Import of pure Saanen from USA
  2015 (100%)  2017 (100%)
  • ♂: 15  11
  • ♀: 20  4
  Total 35  Total 15 (7 single and 4 twinning)
### Production and distribution of goats from GRS (NARC), Bandipur & its Resource Centres

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</thead>
<tbody>
<tr>
<td>Production from Station</td>
<td>Pure Boer</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Boer crosses</td>
<td>60</td>
<td>80</td>
<td>103</td>
<td>126</td>
<td>176</td>
<td></td>
<td>113</td>
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<tr>
<td>Production from Resource centre</td>
<td>Boer crosses</td>
<td>250</td>
<td>385</td>
<td>525</td>
<td>437</td>
<td>411</td>
<td></td>
<td>333</td>
</tr>
<tr>
<td>Distribution from Station</td>
<td>Boer crosses</td>
<td>88</td>
<td>144</td>
<td>121</td>
<td>136</td>
<td>144</td>
<td></td>
<td>85</td>
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<tr>
<td>Distribution from Resource centre</td>
<td>Boer crosses</td>
<td>890</td>
<td>660</td>
<td>719</td>
<td>779</td>
<td>520</td>
<td></td>
<td>240</td>
</tr>
</tbody>
</table>

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.
खरी गेगोको व्यवस्थापन र नियन्त्रणको उपायहरु

१. कुपोषण (Malnutrition) दरबारी प्रत्येक दैनिक भैसीलाई दैनिक २-३ क्षेत्रीय सूचना, बा इत्यादि उपयोग गर्दा तथा पारिपायको प्रोटीन, ग्लोबिन र भिटामिन-वुड शक्तिशक्ति दान (डालो) सुरुवात गर्न नै सामग्री हुनेका महत्त्वासा एक-डेढ महिनासम्म दैनिक १ पशुको (३०-४० ग्राम) कारण पेट्राईलिट नामको सैलस्निक मिश्रण सफल अथवा ऐल्सीन्याको मिश्रण सुरुवात गर्न।

२. पर्यावरण नियन्त्रणको व्यवस्थापन (Management of parasites): प्रत्येक साल वेष्टिंग/ वेष्टिंग अथवा वेष्टिंग माऴा र ब्लूकिन गर्दा अवकाशदाताहरु र विश्वस्त स्वास्थ्य लागी उपचार अथवा त्यसमा सम्पर्क र वितरण संस्थाहरु आयोजना गर्न।

३. गोशालाको व्यवस्थापन (Management of Shed): नेपालको पूर्व र मध्य पशुहरूको क्षेत्रश्रेणी अनुसार चरणार्थ लागी गोशालाको व्यवस्थापन मिलाउने हुनुहोस् र नीसम्म २-४ घण्टा चरणार्थ नियोजन गर्न।

४. पारज्याल डोगाइया परिवर्तन (Transformation) उच्च पहाडी भेगाको पाठेको बौडी भैसीलाई सर्दा वायुमार्ग घुमाउने र भैसीलाई लागि तेम्ने, काप्तु, मिलाउने र बढीपट जस्ता डाले घोषणा र जै. बेरा, नेपराइ, नेपाल जस्ता उरुआर धाँरहरु व्यवस्था नवार्गने।

यथा जानकारीको लागि सम्पर्क देखाना:-
नेपाल मुख्य अनुसंधान प्रणाली
फैसलाविद्या अनुसंधान सहायता सङ्गठन
खुलासार, तलितपुर

टेलिफोन N. ५५५५७०४४
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
Control group
(Pen 9)

Feed: 120 gm/bird
(100% commercial ration)

Age: 24 weeks

Treatment group
(Pen 10)

Feed: 105.6 gm/bird +
14.4 gm nettle preparation
(88% ration +12% nettle)
I. Egg laying performance in two groups
Egg laying performance (38%)

- No. of eggs laid
- Treatment
- Control

- Week 24: Treatment 15, Control 12
- Week 25: Treatment 20, Control 16
- Week 26: Treatment 23, Control 19
- Week 27: Treatment 21, Control 17
- Week 28: Treatment 28, Control 22
- Week 29: Treatment 25, Control 20
- Week 30: Treatment 22, Control 18
- Week 31: Treatment 20, Control 16
- Week 32: Treatment 18, Control 14
- Week 33: Treatment 16, Control 12
- Week 34: Treatment 24, Control 16

- Total eggs laid for Treatment: 299
- Total eggs laid for Control: 216
II. Trend of body weight changes in two groups of pigs (N = 6) fed 30% Sisno (Treatment) and Normal Feed (Control)
Gross appearance

Treatment: more shining

Control
Gross appearance of carcass

Control

Treatment: More compact musculature
### Proximate analysis of pork

<table>
<thead>
<tr>
<th></th>
<th>% Fat</th>
<th>% Protein</th>
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<tbody>
<tr>
<td><strong>Control</strong></td>
<td>37</td>
<td>23.48 ± 5.87</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>39.8</td>
<td>26.26 ± 4.97</td>
</tr>
</tbody>
</table>
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
<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment</th>
<th>Control</th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Infertile</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Unhatched</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Hatched</td>
<td>136</td>
<td>130</td>
</tr>
<tr>
<td>% Hatchability</td>
<td>75.56</td>
<td>72.22</td>
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</table>
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

![Graph showing the effect on milk quality over time and across different groups.]

- Fat %
  - T1: Pre 3.24, Post 3.33
  - T2: Pre 3.52, Post 4.15
  - C: Pre 4.46, Post 4.46
Price in Health Food (WholeFoods) market

Fresh Dried Nettle $50.12/lb

<table>
<thead>
<tr>
<th>Quantity</th>
<th>USD Price</th>
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<tbody>
<tr>
<td>50 ml. (1.7 fl oz)</td>
<td>$11.70</td>
</tr>
<tr>
<td>1000 ml. (33.8 fl oz)</td>
<td>$122.40</td>
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Powder in Nepal: 5-6$/Kg

http://www.gaiagarden.com/products/nettle/10265
## Levels of Polyphenols

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Country of origin and code</th>
<th>Polyphenols mg/Kg</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Nepal, UD1G</td>
<td>7800</td>
</tr>
<tr>
<td>2</td>
<td>Nepal, UD2L</td>
<td>2154</td>
</tr>
<tr>
<td>3</td>
<td>Australia, UU1P</td>
<td>6650</td>
</tr>
</tbody>
</table>
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.