From plough to plate—collaboration delivers results

RIU

Validated RNRRS Output.

Sorghum growers are generating new demand for their crop by promoting its use in place of maize in feed formulas. The feed technique was developed in India, where researchers provided farmers with seeds of improved cultivars and taught them better agricultural practices, while nutritionists collaborated with the feed industry to formulate the feed. Finally, farmer associations brought people together to store and bulk grain and negotiate better prices with the industry. The partners produced easy-to-use brochures, training and extension materials and an institutional framework to sustain the advances over the long term. Perhaps more important, they demonstrated the forcefulness of the coalition approach. This knowledge can help in fine-tuning the approach for use with other crops and in other regions.

Project Ref: **CPH05:**
Topic: **5. Rural Development Boosters: Improved Marketing, Processing & Storage**
Lead Organisation: **ICRISAT**
Source: **Crop Post Harvest Programme**

Document Contents:

Description

CPH05

Research into Use
NR International
Park House
Bradbourne Lane
Aylesford
Kent
ME20 6SN
UK

Geographical regions included:

China, India, Thailand,

Target Audiences for this content:

Crop farmers, Livestock farmers, Processors, Traders,

A. Description of the research output(s)

1. Working title of output or cluster of outputs.

Exploring marketing opportunities through a research, industry and users' coalition: sorghum poultry feed

In addition, you are free to suggest a shorter more imaginative working title/acronym of 20 words or less.

Linking poor farmers with new sources of demand for their crops through innovative coalition approach'

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

Crop Post Harvest Research Program (CPHP) and ICRISAT's core funding

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

R Number: R 8267

S.No.	Partner Institutions	Represented by
1.	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)	Dr Belum VS Reddy - Principal scientist (Sorghum Breeding); and Mr P Parthasarathy Rao, Senior Scientist (Economics)
2.	Acharya NG Ranga Agricultural University (ANGRAU), Rajendranagar, Hyderabad 500 030, Andhra Pradesh, India	Dr VLK Prasad, Professor Department of Livestock Production and Management; Dr A Rajashekar Reddy, Senior Scientist; and Dr D Ramachandriah, Principal Scientist
3.	Federation of Farmers Associations (FFA), Shantinagar, Hyderabad 500 028, Andhra Pradesh, India	Mr P Changal Reddy, Honorary Chairman represented by Dr JR Maruthi; and Dr G Raghunatha Reddy
4.	Andhra Pradesh Poultry Federation (APPF), Hyderguda, Hyderabad 500 028 Andhra Pradesh, India	Mr D Sudhakar - General Secretary

*4. Describe the RNRRS output or cluster of outputs being proposed and when it was produced? **(max 400 words)**. This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a*

database.

Outputs

i) **Poultry feed formulations** with **sorghum cultivars** available

To standardize the proportion of sorghum grain in place of corn in poultry feed rations (broilers and layers, as an energy source) by studying its effect on feed intake, body weight, feed conversion ratio, egg production, shank and egg yolk color, egg production, feed cost, etc. Implications of grain mold severity on productivity and other parameters. Together these studies constitute International Public Good (IPG)

ii) Formation of a sustainable **farmer-scientist-industry coalition**

To develop a coalition of stakeholders involved in sorghum production and supply chain i.e., among researchers, farmers, NGOs, and feed industry for effective linkage from **plough to plate**.

iii) **Technology access** to the target groups accelerated

To transfer the improved crop production technology in order to enhance the productivity though supply of improved cultivars, easy to use brochures, training and extension activities and institutional framework for technology access. Increased awareness on use of sorghum in poultry feed through training and demonstrations.

iv) Understanding **coalition approach** as a process. The understanding would help in fine tuning the coalition approach which can then be applied to other crops/regions i.e., generating IPG for wider application.

Poor sorghum growers face the twin problems of weak social capital and inadequate access to markets. Weak social capital restricts their ability to influence market demand for the crop they grow. The project aims to increase sorghum crop productivity by providing seeds of improved cultivars along with improved package of practices to participating farmers. Poultry nutritionists in collaboration with the feed industry would formulate poultry feed (for broilers and layers) with varying proportions of sorghum. Farmers Federation would group farmers into associations for storing and bulking grain and negotiating bulk sales with industry. To achieve this, the project is exploring innovative institutional arrangements so as to sustain the linkage in the long run.

5. What is the type of output(s) being described here?
Please tick one/ more of the following options.

Product	***Technology***	***Service***	***Process or Methodology***	***Policy***	***Other Please specify***
	X		*X*		

6. What is the main commodity/ies upon which the output(s) focused? Could this output be applied to other commodities? If so, please comment.

Sorghum grain

Market linkages through innovative institutional arrangement by following coalition approach for sorghum use in poultry feed. This approach can be suitably adapted, where at present poor market linkage is constraining production of dry land crops/coarse cereals/oil seeds/pulses etc.

7. What production system(s) does/could the output(s) focus upon?
Please tick one or more of the following options. Leave blank if not applicable.

Semi-Arid	***High potential***	***Hillsides***	***Forest-Agriculture***	***Peri-urban***	***Land water***	***Tropical moist forest***	***Cross-cutting***
X							

8. What farming system(s) does the output(s) focus upon?
Please tick one or more of the following options (see Annex B for definitions).
Leave blank if not applicable

Smallholder rainfed humid	***Irrigated***	***Wetland rice based***	***Smallholder rainfed highland***	***Smallholder rainfed dry/cold***	***Dualistic***	***Coastal artisanal fishing***
				X dry		

*9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).*

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

(a) Farmer access to markets (R8274/R8498)
(b) Inventory credit schemes (R8114)
(c) Participatory market chain analysis (R8182/R8148)
(d) Institutional learning and change (R8500).

Validation

B. Validation of the research output(s)

*10**. How** were the output(s) validated and **who** validated them?*

*Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organization and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organization, government department, aid organization, private company etc. This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation **(max. 500 words)**.*

The project followed an innovative approach of research-farmers-industry coalition that was able to bring together all the stakeholders, and establish market linkages between sorghum farmers and poultry feed manufacturers.

Farmers participating in the project gave a positive feedback stating that there was an increase in sorghum productivity of more than 200 percent as compared to local cultivars grown by them. These findings were corroborated through interviews using a structured questionnaire. Additionally, a post-harvest survey was conducted to understand the farmers' perception regarding the performance of improved sorghum cultivars. Apart from grain yields farmers highlighted superior fodder yields, resistance to pest and diseases, as the other important traits of improved cultivars. Not just the farmers participating in the project, but other farmers in neighboring villages also agreed to the superiority of improved cultivars with regard to greater grain and fodder productivity as compared to local varieties. The ICRISAT-private sector seed consortium was also involved in supplying seeds to participant farmers in Year 2 of implementation due to demand from more number of farmers. The private seed sector will take the lead for large-scale dissemination of seed for sustainable sorghum production after the Project ends. A Steering Committee chaired by the representative from feed industry (Janaki Feeds) was constituted to closely monitor all aspects of Poultry Feed Trials (PFTs) and buying-in of the results by the poultry industry. Based on the perceptions of poultry producers and recommendations of Steering Committee, the poultry nutritionists (from ANGRAU) conducted repeated feed trials ie, part-by-part replacement of maize with sorghum and repeating the trials on commercial layers on the request of the Committee. This helped in faster buy-in of the findings by the industry and poultry federation. The trial results were disseminated to a larger group of poultry producers/feed manufacturers through stakeholders' mini-workshops, which received wide acceptance. The poultry feed manufacturers are convinced about the use of sorghum in poultry feed rations. The above aspects would ensure the role of private sector seed and feed industry in sustaining project activities beyond project life.

In addition, two review teams from DFID independently reviewed the project progress and implementation and appreciated the achievements after interviewing the farmers and other partners involved in the project.

According to the DFID publication, *Journeying from Research to Innovation*, March 2006, "the coalition is set to enable the farmers now to get access to the research director." Further, it said "this project enabled the various partners to work formally together for the first time to convert the knowledge into profitable goods."

The success of this project in the pilot area has encouraged donors to upscale the project to more areas. This, perhaps, is the most rigorous validation of the project by experts not involved in the project.

11. ***Where and when*** *have the output(s) been validated?*

Please indicate the places(s), country (ies) any particular social group targeted and also indicate production system and farming system, using the options provided in Questions 7 and 8 respectively ***(max 300 words)****.*

Mahabubnagar and Ranga Reddy districts of Andhra Pradesh with a semi-arid environment were selected for implementation of the project. Both the districts fall under rainfed and dry semi-arid tropics and sorghum is an important crop here. Under the project, small-scale sorghum growers (74 in number) from four villages of selected districts were supplied with the improved sorghum cultivars for planting in *rainy season 2003.* The crop performance, as pure and as intercrop with pigeonpea systems, was monitored regularly and farmers were advised on the sorghum production practices to be followed for increased productivity. During the meetings with farmers in selected villages, a positive feedback was received with regard to the performance of supplied cultivars over the locally grown sorghums. The grain was bulked cultivar-wise and supplied to feed manufacturers by farmers. Seeing the enthusiasm and positive response of the farmers, in rainy season 2004 more than 500 small-

scale sorghum growers spread over 12 villages in the target districts were willing to participate in the project. The ICRISAT-private sector consortium was involved in supplying seed to participant farmers in 12 villages. This ensures the role of private sector seed industry in project implementation.

Current Situation

C. Current situation

12. ***How and by whom*** *are the outputs currently being used? Please give a brief description* ***(max. 250 words****).*

The outputs of sorghum coalition project are being up scaled in a Project on "Enhanced utilization of sorghum and pearl millet grains in poultry feed industry for improvement of the livelihoods of small scale farmers in Asia" funded by CFC-FAO implemented by ICRISAT.

The small sorghum growers are accessing improved sorghum cultivar seeds, and improved package of practices, crop management practices, from the Farmers Federation who are important partners in the sorghum poultry feed coalition. Seed producers are active with enhanced market opportunities in the up-scaled areas. The crop breeders are following the performance of the improved cultivars and constraints in their adoption if any. The poultry growers and feed manufacturers are ready to access the bulk supply of the sorghum and pearl millet grains. Thus, sorghum growers, seed producers, crop and poultry researchers, poultry producers, and feed manufacturers (industry), are the major stakeholders in enhancing their knowledge of the research outputs and applying them at the ground level. Further, the outputs are useful to the extension workers and line departments of the Government at ground level. The coalition process learnt in this DFID project is being implemented in CFC/FAO/ICRISAT project on a larger scale involving more stakeholders. For example, bankers are also now part of the coalition.

13. ***Where*** *are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used* ***(max. 250 words).***

The outputs with sorghum coalition are being up scaled in a CFC/FAO funded project (Project No CFC/FIGG/32) on "Enhanced utilization of sorghum and pearl millet grains in poultry feed industry for improvement of the livelihoods of small scale farmers in Asia" led by ICRISAT, for a period of three years (2005-2008). The project is operational in 3 countries: India (Andhra Pradesh and Maharashtra states); China (Liaoning province); and Thailand (Suphan Buri province). Farmers are being trained on grading and scientific storage of the rainy season grain, bulk marketing, and negotiating sales directly with the industry. In addition to sorghum, pearl millet is also included in the project. The project is being implemented in 2 clusters in Andhra Pradesh state (12 villages); 3 clusters in Maharashtra state (15 villages); 1 cluster in China (6 villages) and 1 cluster in Thailand (6 villages). Each cluster consists of about 1000 participating farmers in the first year and this is likely to increase in Years 2 and 3 with more farmers and villages. The outputs of both the projects

will be out scaled to other states / provinces after 2007.

14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading ***(max 250 words).***

The coalition concept has been used in CFC/FAO funded project to enhance the utilization of sorghum and pearl millet grains in poultry feed formulations. All the coalition partners under the DFID funded project continue to be partners in the expanded project. Additional partners have joined for geographic and vertical spread of the project outputs. The present coalition consists of nine partners in India and three partners each in China and Thailand besides participating farmers. This signifies buy-in of the coalition approach for achieving common goals. As indicated, use of all the outputs is spreading under the expanded project with more crop and geographic coverage.

15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? ***(max 350 words).***

From the conception stage, the project-included all the stakeholders ie,, sorghum-growing farmers, Federation of Farmers' Associations, poultry producers, Poultry Federation, feed manufacturers (Janaki Feeds) and crop research institute (ICRISAT), and poultry research institute (ANGRAU) in all stages of project development and implementation. A series of stakeholder meetings were organized to ensure the active participation of all members at every stage. By the second year of implementation of the project, private sector also took active part by supplying seed of improved cultivars for the project farmers at subsidized prices, which ensures the role of private sector in up scaling the project in future. The poultry producers are also showing interest to partner with sorghum growers by way of supplying poultry manure and purchasing the surplus sorghum produce in bulk quantities. The project also explored institutional arrangements to establish an organic linkage between research, producers and end users (poor consumers & industrial users) that will lead to the overall welfare of poor sorghum growers.

The success of the coalition system is because it provided an opportunity to the members to contribute knowledge in their respective fields, work towards a common goal with clearly defined roles and responsibilities, ability to articulate their problems and prospects, and enthusiasm to work in groups and share synergies.

The coalition system, thus, helped to present the right kind of incentives to benefit poor sorghum farmers, feed manufacturers, poultry producers, and scientists. All partners were also assured of the benefits from this project independently.

- The crop breeder got feedback on the cultivars traits preferred by the farmers.
- The poultry scientists developed new sorghum-based feed formulations for poultry in lieu of maize, which will benefit the poultry producers.
- The poor sorghum farmers benefited from the collaborative help/guidance from researchers, and from improved cultivars cultivation by implementation of the project at grass root level.
- The poultry feed manufacturers/poultry growers benefited from knowledge on poultry feed

formulations and assured supply of sorghum grain, an alternative to maize.

This approach can be suitably adapted, where presently poor market linkage is constraining production.

Current Promotion

D. Current promotion/uptake pathways

*16. **Where** is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion **(max 200 words).***

Presently the sorghum grain use in poultry feed is being promoted in China, Thailand and India. In China, Liaoning Academy of Agricultural Sciences (LAAS), Shenyang, is responsible for promoting use of sorghum in alternative uses in one cluster (6 villages, 1000 farmers) in Liaoning province. In Thailand, in Suphan Buri province a major sorghum growing region, with one cluster (about 6 villages, 900 farmers) are participating in the project under the coordination of Field Crops Research Institute (FCRI), Bangkok. In India, the project outputs of the DFID funded project are being upscaled in two states namely Maharashtra and Andhra Pradesh. In Maharashtra three clusters (7 villages, 1200 farmers for each cluster) have been selected in Parbhani and Beed districts. In Andhra Pradesh two clusters (9 villages, 1400 farmers for each cluster) in Mahabubnagar district are involved in the upscaling. The project aims to increase the number of clusters in the third year (2007-08) of implementation.

*17. What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. **(max 200 words)**.*

- The surplus produced above subsistence needs can be highly variable due to low productivity and uncertain level of production achieved by small-scale producers.
- Formal market channel does not provide an effective means to industry for purchase of bulk grains of uniform quality, while informal channels may be constrained due to lack of support.
- Smallholders have poor access to improved cultivars suitable for their area and in right time
- Insufficient storage facilities for bulking and storing the surplus produce for collective marketing
- Government policy with regard to maize imports or procurement could adversely affect uptake of sorghum in poultry feed industry.

*18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues **(max 200 words).***

- Establishment of infrastructure, such as village level storage structures and grain drying facilities
- Promoting informal/formal institutional arrangements to link farmers and poultry feed manufacturers creating a win-win situation.
- Training of farmers on issues related to grading, bulking and scientific storage to meet the industrial

demand

- Strengthening of farmers association in negotiation skills while bargaining with industry for better prices
- Capacity building of farmers associations on input and output supply management system.
- Government policy support should be similar for all coarse cereals (maize, sorghum, pearl millet etc.) with respect to procurement, trade and price support.

19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? ***(max 300 words).***

For all the stakeholders, this was their first experience of participating in such a broad-based coalition involving different types of organizations (public sector, NGOs, private sector and farmers) having different skills and expertise (science, farming, commerce). All had learned from working in a coalition that collectively they can work at a faster pace, and achieve their objectives more quickly than they could have done by working in isolation. The 'coalition' allowed capitalizing on the synergies for sharing of skills from different disciplines with each member playing his/ her role in the project.

Lessons learnt

Generic – all partnerships

- Clear objectives
- Flexibility and creativity
- Credible and 'legitimate' representatives of stakeholders
- Matching evidence and communication to the audience
- Monitoring of impact, not just outputs, on indirect as well as direct stakeholders
- Formal networking and informal contacts
- Shared and participatory leadership

Specific – sorghum poultry coalition

- Financial accountability
- Transparent and consensual management
- Collective planning, innovation and learning
- Trust among partners
- Appropriate division of tasks, stakeholders involved only when it meets their interests
- Regular face-to-face meetings
- Courtesy and the 'personal touch'.

Impacts On Poverty

E. Impacts on poverty to date

20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place? This should

include any formal poverty impact studies (and it is appreciated that these will not be commonplace) and any less formal studies including any poverty mapping-type or monitoring work, which allow for some analysis on impact on poverty to be made. Details of any cost-benefit analyses may also be detailed at this point. Please list studies here.

- Baseline study of project area
- Cost benefit analysis of improved and local sorghum cultivars
- Perceptions of farmers on improved cultivars performance and collective marketing

21. Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) ***(max. 500 words):***

- *What positive impacts on livelihoods have been recorded and over what time period have these impacts been observed? These impacts should be recorded against the capital assets (human, social, natural, physical and, financial) of the livelihoods framework;*
- *For whom ie, which type of person (gender, poverty group (see glossary for definitions) has there been a positive impact;*
- *Indicate the number of people who have realized a positive impact on their livelihood;*
- *Using whatever appropriate indicator was used detail what was the average percentage increase recorded*

Since improved as well as local sorghum cultivars were grown in similar agro-climatic conditions, the crop yields of both were comparable. The yield of improved sorghum cultivars was higher than that of local cultivars by about 200% in Mahabubnagar and Ranga Reddy districts in 2003 rainy season. Despite higher cost of cultivation, the net returns/ benefit-cost ratio obtained for improved sorghum was higher in both the districts. Also, per unit cost of production (Rs. t^{-1}) was lower than that of traditional varieties in both the districts, ensuring higher profitability to the farmers.

The project impacts will be mainly on the moderate poor (most likely to access new livelihood opportunities and use as a stepping stone out of poverty) together with non-poor and **extreme vulnerable poor** (assetless or near assetless male & female headed households in rural areas). This includes subsistence farmers who may have small areas for food production.

Regarding impacts, it is too early to measure the impacts at the household level (leave alone at aggregate or macro level) since the spread of technology is limited to farmers participating in the project in selected villages and a few farmers outside the project, that too for two years only. Secondly, participating farmers have allocated only a small proportion of their land for improved sorghum cultivars, leaving some land for traditional sorghum cultivars as a risk mitigating strategy. Additionally, farmers are growing a number of other crops, which have not been impacted by this project. Hence, in the short run, the impact would be mainly restricted to higher income from growing improved sorghum cultivars and bulk sales to industry. Given the small size of such farms the impacts initially is on financial asset only, that too from a low base.

Regarding perceptions—majority of the farmers expressed the superiority of improved cultivars with respect to grain and fodder yields. They also expressed that they can obtain better prices through collective marketing and save on marketing and transport cost.

Environmental Impact

H. Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? ***(max 300 words)***

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

Sorghum is a low input crop and developing new market for this crop would support the expansion of low input agricultural production. Increased cultivation of this drought tolerant crop will prevent the land from remaining fallow thereby preventing soil erosion. Thus, positive environmental benefits are perceived.

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? ***(max 100 words)***

No adverse environmental impacts are foreseen.

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? ***(max 200 words)***

Being a crop of low resource intensity that meets the multiple needs of farmers like food, feed, fodder and income, the vulnerability of the crop to natural disasters would be potentially risky for the poor. The increased awareness on crop management aspects under the improved package of practices and adoption of cultivars more resistant to biotic and biotic stresses will help the farmers to cope better with crop failures due to external shocks.