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Establishment of beef industries in additional red soils provinces in China

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Contents

1	Acknowledgements	3
2	Executive summary	4
3	Background	5
4	Objectives	5
5	Methodology	5
5.1	Program on May 24	6
5.2	Program on May 25	7
5.3	Participants and their Affiliations were:.....	8
6	Achievements against activities and outputs / milestones	11
7	Key results and discussion.....	11
8	Impacts	12
8.1	Scientific impacts – now and in 5 years	13
8.2	Capacity impacts – now and in 5 years	13
8.3	Community impacts – now and in 5 years	13
8.4	Communication and dissemination activities	14
9	Conclusions and recommendations	14
9.1	Conclusions.....	14
9.2	Recommendations	14
10	References.....	14
11	Appendixes.....	14

1 Acknowledgements

This workshop was the initiative of Professor Xu Minggang who successfully secured partial funding from Chinese sources. Professor Xu and Mr Wen Shilin planned the workshop program, invited the senior officials from the Red Soils Provinces and were also responsible for the smooth running of the workshop. Mr Wen and Professor Xu edited the proceedings of the workshop which were presented to the delegates on arrival. Their enthusiasm for ensuring that the information presented to the workshop was extended to other Provinces and their efforts in planning and executing a successful workshop is gratefully acknowledged.

2 Executive summary

The ACIAR sponsored project “Ruminant Production in the Red Soils Region of south central China” has established the basis for a profitable beef industry in two of the 12 provinces that are incorporated within the Red Soils region, viz. Hunan and Jiangxi. This was achieved by defining inventories of potential feedstuffs for both provinces, and then designing appropriate feed year plans based on producing improved forages and developing cattle feeding strategies to accommodate moderate to rapid live weight gains in cattle. Outputs from the project included two models. One model matches land area available for forage production, forage yields and cattle feed requirements. It is used to determine the number of cattle a smallholder household can fatten, given the area of land available for forage production and the desired growth rate of the cattle. It also allows the smallholders to determine the land areas sown to summer and cooler season forages so a complete feed year plan can be achieved. A second economic and resource allocation model provides an assessment of the potential contribution that cattle raising and fattening activities can make to total household income. This model allows the economic optimization of livestock and cropping activities in a Chinese smallholder mixed farming system.

Prior to farmers adopting the forage and feeding management technologies that have been developed in this project, beef production on smallholder farms was only marginally profitable because feeding strategies were largely based on straws and other feedstuffs of low nutritive value and growth rates of cattle were very low. Substantiation of the success of the project in these two provinces is provided in the final report.

The translation of the scientific outputs to significant on-farm impact has been achieved by close collaboration of Chinese project staff and the Provincial extension agencies. The main impact to date has largely been confined to the two Provinces where feeding trials were conducted and extension activities were undertaken by local Provincial officers. The challenge remained to achieve adoption in the other 10 Red Soils Provinces by demonstrating to senior officers the success that has already been achieved in Jiangxi and Hunan.

Forty senior officials from all Red Soils Provinces attended a workshop in Hunan where the success of the forage production and beef cattle feeding technologies were showcased in a series of verbal presentations and in a field excursion.

Proceedings of the workshop were published in bound volumes and distributed to participants at the workshop. There was demonstrated interest from 4 additional Red Soil Provinces (Fujian, Guangxi, Sichuan, Hubei) in adopting the forage production and beef feeding technologies that were detailed at the workshop. Each of these Provinces has requested training courses from Professor Xu Minggang and Mr Wen Shilin. Professor Xu and Mr Wen agreed to provide training in late 2007 or early 2008. It was recognized that forage species, forage agronomy and forage conservation may have to be modified to suit Provinces where the climate was significantly different from that in Jiangxi and Hunan.

There was strong support from the Chinese officials for the formation of a Red Soils Research and Extension network to ensure the adoption of appropriate forage and cattle feeding technologies across the region. It was clearly recognized that the procedures that were successful in Hunan and Jiangxi may need to be modified for application for other Provinces. It is suggested that leading the formation of such a network and its' operation in the early years should be the responsibility of project leaders in the ACIAR project. Professor Xu Minggang and Mr Wen Shilin have the seniority, the enthusiasm and the technical expertise to form such a network and lead it through its infancy. In addition their organization, CAAS, has a China-wide mandate so is more suited to cross-Provincial coordination than an institution serving the interests of only one Province.

The data to date suggest that this project has made a major contribution to the establishment of profitable beef production in two provinces of the Red Soils Region of China. The forage production and cattle feeding technologies that the project developed have now been used by smallholder farmers for 3-4 years. Plans are in place for the project team to undertake an evaluation exercise later in 2008 to measure the lasting impacts of the adoption of beef production on the financial well being and quality of life of smallholder households in the region.

3 Background

The ACIAR sponsored project “Ruminant Production in the Red Soils Region of south central China” has established the basis of a profitable beef industry in two of the 12 provinces that are incorporated within the Red Soils region, viz. Hunan and Jiangxi. This was achieved by defining feedstuff inventories for the provinces and then designing appropriate feed year plans based on producing improved forages and developing cattle feeding strategies to accommodate moderate to rapid liveweight gains in cattle. Prior to smallholder households adopting the technologies developed in this project, beef production was only marginally profitable because local feeding strategies were largely based on straws and other feedstuffs of low nutritive value with the consequence that growth rates of cattle were very low. Substantiation of the success of the project in these two provinces is provided in the final report.

The translation of the scientific outputs to significant on-farm impact was achieved by close collaboration of Chinese project staff and the Provincial extension agencies. The impact to date has largely been confined to the two Provinces where forage production and feeding trials were conducted and extension activities were undertaken by local Provincial officers. The major challenge remained to achieve wider adoption in the other 10 Red Soil Provinces by demonstrating to senior officers the success that has been achieved in Jiangxi and Hunan. This approach is consistent with the way that extension is planned and conducted in the Peoples Republic of China.

Advice from Professors Xu Minggang and Shi Qinghua was that this demonstration task would be best achieved through an initial 2 day workshop that was directly aimed at convincing senior government officials that similar success is also possible in their provinces. A high priority for China is the establishment of forage based beef production. Professors Xu Minggang and Shi Qinghua are influential Chinese research managers who were instrumental in securing Chinese investment and aligning scientists and extension specialists in the completed project. Xu Minggang is Director of the Soil Science Department of CAAS and Shi Qinghua is President of Jiangxi Agricultural University.

4 Objectives

To demonstrate how a profitable beef industry based on improved forage production and cattle feeding practices was established in Jiangxi and Hunan Provinces.

To initiate a process that will lead to the rapid establishment of profitable beef industries in the other 10 Red Soils Provinces.

5 Methodology

A two day workshop was held in Yongzhou City, Hunan Province in May 2007. Visits to rural villages for participants to interact with smallholder farmers who had adopted forage production and cattle feeding technologies were an integral part of the workshop.

The workshop program was:

5.1 Program on May 24

Time	Activities/Presentations	Speaker(s)
Chairman: Professor Xu Minggang		
08: 30-09:30	Open Ceremony	MOA Yongzhou Government Dr. Bob Hunter Hunan Animal Husbandry Bureau Take group pictures
09:30-09:50	Morning tea	
Chairman : Professor Lai Zhiqiang		
09:50-10:30	ACIAR Project 9835 overview, Problems and Countermeasures for Utilization of Grassland in Red Soil Regions of Southern China	Prof. Xu Minggang, CAAS
10:30-11:00	The Development Potential and Strategies of Ruminants Production in Hubei Province	Prof. Hong Qi, Hubei Animal Husbandry Bureau
10:50-11:20	The Development Status and Strategies of Native Grassland in Hunan Province	Prof. Gao Chunshi, Hunan Animal Husbandry Bureau
11:20-11:50	An economic assessment of forage options to improve the profitability of smallholder beef cattle enterprises in the Red Soils Region of China	Mr. N.D. MacLeod/Wen Shilin, CSIRO/CAAS
12:00-13:00	Lunch	
Chairman : Professor Yi Kexian		
13:30-14:00	An Introduction of forages and Ruminant Production in Sichuan Province	Prof. Li Yuanhua, Sichuan Grassland Management Station
14:00-14:30	A Computer Model on Feedstuff Requirement of Beef Cattle Production	Prof. John Nolan/ He Yuyong, UNE
14:30-15:00	Quality and seasonal yields of promising forage species in southern Hunan Province	Wen Shilin, CAAS
15:00-15:30	The Progress of Forages Study in Fujian Province	Prof. Huang Yibin, FAAS

15:30-15:50	Afternoon tea	
15:50-16:20	The Study on the techniques of Forages Planting and Conservation in Red Soils Region	He Yuyong, JAU
16:20-16:50	Forages Evaluation in Red Soils Region of Guangxi	Lai Zhiqiang, Guangxi Animal Husbandry Institute
16:50-17:20	Beef Cattle Production in Jiangxi Province	Director Wu Zhiyong, Jiangxi Animal Husbandry Extension Station
17:20-17:50	Studies on rotational grazing of goats in artificial grassland and balanced mode of forage supply in hilly area of South China	Huang Xiusheng, FAAS
18:00-	Banquet hosted by Yongzhou Government	

5.2 Program on May 25

Time	Presentations	Speaker(s)
Chairman: Professor Xu Minggang		
8:00-8:30	Tropical Forage Technologies Development and Multiple Utilization in China	Prof. Yi Kexian, Chinese Academy of Tropical Agricultural Science
8:30-8:45	Beef Cattle Production in Panyang Lake Region	Professor Hu Mingwen, JAU
8:45-9:00	A Computer Model for Predicting the Potential of Ruminant Production	Wen Shilin, CAAS
09:00-9:15	Forages for Year-round Feeding of Cattle in Red Soils Region	Xie Guoqiang, JAU
09:15-09:30	The Studies on Cross-bred Beef Cattle Production in Jiangxi	He Yuyong, JAU
09:30-9:45	An Introduction on "Forage-Cattle-Biogas" Ecosystem	Xie Guoqiang, JAU
09:45-10:00	The Studies on Beef Cattle Production in Hunan	Wen Shilin, CAAS
10:00-10:20	Morning tea	
10:20-10:50	Discussion on the Significance and Measures of the Dairy Industry Developing in Southern China	Yang Ligu, Agricultural University in Central China
10:50-11:10	Extension in Hunan	Prof. Xu Minggang, CAAS

11:20-11:40	Extension in Jiangxi	Director Wu Zhiyong, Jiangxi Animal Husbandry Extension Station
11:40-12:00	The introduction of two promising legumes -Wynn cassia and Lotononis	Wen Shilin
12:00-13:00	Lunch	
13:30	Field Trip	Chairman: Gao Jusheng
	1. Forage demonstration plot, Red Soils Experimental Station	
	2. Special farmers raising beef cattle and goats in Qidong and Qiyang counties	
19:30-	Banquet hosted by CAAS/ACIAR/JAU	
20:30-22:40	Discussions about ruminant production	Chairman: Mr Wen Shilin
	1. What is the situation?	
	2. What is the problem?	
	3. What information and experiences have we got from the workshop?	
	4. What will we do for the next step?	

5.3 Participants and their Affiliations were:

Name	Sex	Organization	Position
Bob Hunter	M	Beef Cattle Research Centre, CSIRO	Head
Neil MacLeod	M	CSIRO Sustainable Ecosystems	Principal Scientist
John Nolan	M	UNE, Australia	Professor
Daryl Savage	M	UNE, Australia	Dr.
Peter Buttery	M	University of Nottingham Ningbo Campus	CEO
Mrs Buttery	F	University of Nottingham Ningbo Campus	
Zhang Xinmin	M	Agriculture Technology Development Centre, Ministry of Agriculture	Director
Cheng Yanjun	M	Department of International Cooperation, CAAS	Project Officer
Liu Shiqing	M	Yongzhou Government	Deputy Mayor
Tang Dingqi	M	Yongzhou Government	Deputy Secretary
Yuan Ma'e	F	Yongzhou People Congress	Deputy Head
Xu Minggang	M	CAAS	Professor

Li Yuanhua	M	Grassland Station, Sichuan Animal Husbandry Bureau	Professor
Zhang Guicai	M	Department of Feedstuff and Forages, Hunan Animal Husbandry Bureau	Director
Hu Gongmin	M	Animal Husbandry Technology Extension Station, Hunan Animal Husbandry Bureau	Deputy Director
Wen Lihua	M	Animal Husbandry Technology Extension Station, Hunan Animal Husbandry Bureau	Deputy Director
Gao Chunshi	M	Department of Feedstuff and Forages, Hunan Animal Husbandry Bureau	Deputy Director
Huang Xiusheng	M	Fujian Animal Husbandry Bureau	Associate Professor
Hunag Yanbin	M	Institute of Agriculture Ecology, Fujian Academy of Agricultural Sciences	Director
Yang Liguo	M	Central China Agricultural University	Professor
Hua Guohua	F	Central China Agricultural University	Dr.
Hong Qi	F	Department of Feedstuff and Forages, Hubei Animal Husbandry Bureau	Deputy Director
Yi Kexian	M	Chinese Academy of Tropical Agricultural Sciences (CATAC)	Professor
Chen Longhe	M	Subtropical Crop Institute, CATAC	Lecturer
Luo Ping	F	Subtropical Crop Institute, CATAC	Deputy Director
Xie Guoqiang	M	Jiangxi Agricultural University	Professor
He Yuyong	M	Jiangxi Agricultural University	Associate Professor
Hu Mingwen	F	Jiangxi Agricultural University	Professor
Wu Meiyuan	M	Department of Feedstuff and Forages, Guangxi Animal Husbandry Bureau	Deputy Director
Luo Yongtai	M	Guangxi Forages Extension Station	Deputy Director
La Zhiqiang	M	Guangxi Animal Husbandry Institute	Deputy Director
Li Wensheng	M	Guangxi Forages Extension Station	Director
Zhou Guoqi	M	Qidong County Animal Husbandry Bureau	Director
Lai Yanping	M	Yongzhou Prefecture Animal Husbandry Bureau	Director
Gao Honghua	M	Yongzhou Prefecture Animal Husbandry Bureau	Deputy Director
Yong Qiuyuan	M	Yongzhou Prefecture Animal Husbandry Bureau	

Lu Shaodi	M	Lengshuitan County Animal Husbandry Bureau	Director
Zheng Mengsheng	M	Yongzhou Prefecture Animal Husbandry Bureau	
Guo Shisheng	M	Yongzhou Prefecture Animal Husbandry Bureau	
Wang Shengxue	M	Yongzhou Prefecture Animal Husbandry Bureau	
Huang Jiasheng	M	Yongzhou Prefecture Animal Husbandry Bureau	
Wang Yihong	F	Yongzhou Prefecture Animal Husbandry Bureau	
Hong Jifa	M	Lengshuitan County Animal Husbandry Bureau	Deputy Director
Zhou Yonggui	M	Jiangyong County Animal Husbandry Bureau	Director
Pang Ruijun	M	Jianghua County Animal Husbandry Bureau	Director
Jiang Fangbin	M	Dao County Animal Husbandry Bureau	Director
Li Meiguang	M	Qiyang County Animal Husbandry Bureau	Director
Wen Shilin	M	Red Soils Research Station, CAAS	Deputy Director
Gao Jusheng	M	Red Soils Research Station, CAAS	
Huang Jing	M	Red Soils Research Station, CAAS	
Huang Pingna	F	Red Soils Research Station, CAAS	
He Zhengquan	M	Qiyang County	Special Farmer
Li Ji	M	Dong An County	Special Farmer
Wang Yuyong	M	Dong An County	Special Farmer
Zhang Ji	M	Qidong County	Special Farmer

6 Achievements against activities and outputs / milestones

Objective 1:

no.	activity	outputs / milestones	completion date	comments
1.1	To demonstrate how a profitable beef industry based on improved forage production and feeding practices was established in Jiangxi and Hunan Provinces	Workshop held in Yongzhou City, Hunan Province. May 24-26, 2007		
1.2	To initiate a process that will lead to the rapid establishment of profitable beef industries in the other 10 Red Soil Provinces	Workshop held in Yongzhou City, Hunan Province. May 24-26, 2007		

PC = partner country, A = Australia

7 Key results and discussion

Proceedings of the Yongzhou workshop were published in bound volumes and distributed to participants at the workshop. Copies of the proceedings have also been sent to ACIAR. There was demonstrated interest from 4 additional Red Soil Provinces (Fujian, Guangxi, Sichuan, Hubei) in adopting the forage production and beef feeding technologies that were detailed at the workshops. Each of these Provinces has requested training courses from Professor Xu Minggang and Mr Wen Shilin. Professor Xu and Mr Wen agreed to provide training in either late 2007 or early 2008. It was recognized that forage species, forage agronomy and forage conservation may have to be modified to suit Provinces where the climate was significantly different from that in Jiangxi and Hunan.

The ACIAR project identified dwarf elephant grass and dwarf elephant grass hybrid as forage species that are suitable for cut and carry beef production. Prior to the project this forage was not used in the Red Soil Provinces as a ruminant feedstuff. While both forages are now common place on smallholder farms in Jiangxi and Hunan, their use for cattle feeding has not crossed provincial borders. Officials from several Provinces saw the considerable potential of these species for underpinning successful cattle feeding regimes and took planting material home with them.

While this project concentrated on forage production and cattle feeding technologies to increase growth rate of slaughter generation cattle, data from Statistical Year Books of Jiangxi and Hunan suggest that these technologies were also applied to breeding females. The "new" Provinces drew attention to the fact that low reproduction rates in breeding age cows as well as low growth rates for feeder cattle were limiting beef production. From the workshop presentations and discussions, it was recognized that the introduction of forages of higher nutritive value, conservation of forages and better utilization of crop residues would contribute to the improved year round feed supply, which is the prerequisite for a significant increase in reproduction rates, growth rates and ultimately annual beef turnover.

In some of the "new" Provinces, notably Guangxi, there are serious limitations on the area of land that is available for planting forages. High yielding species like dwarf elephant grass and dwarf elephant hybrid are ideal for this situation. A delegate from Guangxi suggested that use of land in orchards, fallow paddy fields and wasteland should be also be explored.

There was strong support for the formation of a Red Soils Research and Extension network to promote and support the rapid adoption of appropriate forage and cattle

feeding technologies across the region. It was recognized that the procedures that were successful in Hunan and Jiangxi may need to be modified for other Provinces with different climatic conditions. It is suggested that leading the formation of such a network and its' operation in the early years should be the responsibility of project leaders in the ACIAR project. Professor Xu Minggang and Mr Wen Shilin have the seniority, the enthusiasm and the technical expertise to form such a network and lead it through its infancy. In addition their organization, CAAS, has a China wide mandate so is more suited to cross-Provincial coordination than an institution serving the interests of only one Province.

There was interest expressed from Guangxi in Australian varieties of leucaena as a feed for grazing cattle. The climate and soil types in Guangxi are more suited to leucaena than in Hunan where the cold winter limits its' productivity. Some varieties of Leucaena have been grown in Hunan during the project with limited success.

The workshop drew the attention of participants to the use of straws and fibrous crop residues for feeding cattle during winter. Use of supplementary nutrients to overcome deficiencies in the straws which limit feed intake and mixing highly digestible forages with the straws enables positive liveweight gain of cattle. The traditional methods of feeding straws provide only for about maintenance energy requirements. This more efficient use of straws ensures liveweight gain in every month of the year and contributes to the feed year plan concept which was successfully demonstrated in the initial ACIAR project. Workshop participants drew attention to this advance as a solution to the feed shortage problems encountered during the harsh winters.

There was considerable interest in the use of the two models developed by the project for training extension specialists in profitable beef production based on forages. One model matches the area of land for forage production, forage yields and cattle feed requirements. It is used to determine the number of cattle a smallholder household can fatten, given the land available for forage production and the desired growth rate of the cattle. It also allows the smallholders to determine the land areas sown to summer and cooler season forages so a complete feed year can be achieved.

The second economic and resource allocation model provides an assessment of the contribution of cattle raising and fattening activities to total household income. It allows the economic optimization of livestock and cropping activities in a Chinese smallholder mixed farming system.

There was also some significant discussion about spin-offs from the forages and feeding technology for other agricultural purposes. For example, in Hunan and Jiangxi there is already large scale feeding of goats and fish with dwarf elephant grass. One Provincial Director also saw Lotononis as a potential feedstuff for geese; and the use of Lotononis to control soil erosion on sloping grounds in orchards was showcased on farm visits in Hunan Province. Several officials intended to adopt this in their home Provinces.

8 Impacts

The immediate impacts of the first 2 phases of the project in Jiangxi and Hunan Provinces have been documented in the final report of Phase 2 as was submitted in 2006.

The objective of the present workshop was to achieve wider extension of the forage production and feeding technologies developed by the project within all of the other Red Soil Provinces. Senior officials from the "new" Provinces left the workshop keen to establish similar beef production systems within their Provinces.

The project team has well-developed plans to:

- Measure progress towards on-farm impact in the “new” provinces
- Measure on-going beef production impact in both Hunan and Jiangxi
- Measure the economic and welfare impact of the adoption of beef production on smallholder households in several villages acting as case studies. The villages were originally surveyed in 2002 to obtain baseline data for modelling, and could be resurveyed in 2008.

Measurements of the extent of on-farm adoption in “old” and “new” Provinces will be made by Professor Xu Minggang, Bob Hunter and John Nolan on a visit to China late in 2008. Prior to the visit, a detailed survey will be conducted by the project team in Jiangxi, Hunan, Fujian, Guangxi, Sichuan, and Hubei Provinces. The survey questions will be similar to those that were developed to measure initial impact in Hunan and Jiangxi. The six Provinces will then be visited for clarification of the survey data and discussion of provincial plans to accelerate adoption. Any modifications of the Jiangxi and Hunan technologies will be discussed.

Neil MacLeod and his Chinese colleagues propose to measure the changes in land use, cropping and livestock activities in selected villages since the previous survey in 2002. They will also document the small-holders’ experience with adopting the technologies and how the beef production technologies have impacted on the households’ material, personal and social well-being. The plan is to survey 10-15 households in 1 to 2 villages in Hunan and Jiangxi Provinces.

A more detailed proposal for impact assessment will be submitted to ACIAR later this financial year.

8.1 Scientific impacts – now and in 5 years

The known impacts to date of the project technologies are documented in the final report of Phase 2 as submitted in 2006. Planning has commenced to measure impacts in the two project provinces of Jiangxi and Hunan in late 2008. This will be about four years after the conclusion of Phase 1 of the project which developed and verified the forage production and cattle feeding technologies.

Phase 2 which concluded in June 2006 focussed on extended on-farm adoption.

8.2 Capacity impacts – now and in 5 years

The immediate effects of capacity building were documented in the report submitted in 2006. The proposed visit in late 2008 will investigate the more lasting impacts

8.3 Community impacts – now and in 5 years

The proposed visit in late 2008 will investigate the consequences of the adoption of beef production by farmers in villages

8.3.1 Economic impacts

The proposed visit in late 2008 will investigate the economics of beef production in selected smallholder villages acting as case studies. Since the project has been completed there have been relative shifts in the prices of beef compared to other farm products.

8.3.2 Social impacts

The proposed visit in late 2008 will investigate the quality of life impacts in smallholder villages which have adopted beef production activities based on improved forage and feeding technologies.

8.3.3 Environmental impacts

Part of the original motivation for the project was the use of forages on slopes to control soil erosion. Widespread planting of forages helped in retaining soil on slopes, though this focus was diluted in the evolution of the project as the Chinese authorities placed the major emphasis on forage production on existing arable land, rather than on hilly wasteland.

8.4 Communication and dissemination activities

Documented in previous report

9 Conclusions and recommendations

9.1 Conclusions

The workshop was the first step in bringing the achievements in Hunan and Jiangxi Provinces to the attention of senior officials in the other Red Soil Provinces. Future adoption of forage and beef technologies will depend on the commitment of provincial officials to drive change in their Provinces and the technical assistance they are able to receive from their colleagues in Jiangxi and Hunan.

9.2 Recommendations

This has been a successful project and there is benefit to Australia and China from measurement of on-going impact in the period after the initial burst of enthusiasm.

10 References

Given in previous report.

11 Appendixes

None.