SHRUBS AND TREE FODDERS FOR FARM ANIMALS

PROCEEDINGS OF A WORKSHOP IN DENPASAR, INDONESIA, 24 – 29 JULY 1989

IDRC
CANADA

The International Development Research Centre is a public corporation created by the Parliament of Canada in 1970 to support research designed to adapt science and technology to the needs of developing countries. The Centre's activity is concentrated in six sectors: agriculture, food and nutrition sciences; health sciences; information sciences; social sciences; earth and engineering sciences; and communications. IDRC is financed solely by the Parliament of Canada; its policies, however, are set by an international Board of Governors. The Centre's headquarters are in Ottawa, Canada. Regional offices are located in Africa, Asia, Latin America, and the Middle East.

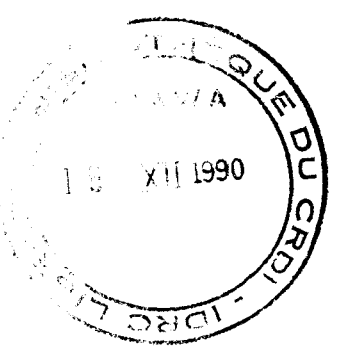
Cover photo: D. Brian Palmer.

IDRC-276e

Shrubs and tree fodders for farm animals

Proceedings of a workshop in Denpasar, Indonesia, 24–29 July 1989

Editor: C. Devendra



IDRC
CANADA

PO Box 8500, Ottawa, Ont., Canada K1G 3H9

Devendra, C.
IDRC. Regional Office for Southeast and East Asia, Singapore SG

IDRC-276e

Shrubs and tree fodders for farm animals: proceedings of a workshop in Denpasar, Indonesia, 24–29 July 1989. Ottawa, Ont., IDRC, 1990. xii + 349 pp.:ill.

/Trees/, /fodder/, /feed/, /animal nutrition/, /developing countries/ — /animal husbandry/, /agroforestry/, /ruminants/, /research and development/, /forage/, /case studies/, /conference papers/.

UDC: 636.085

ISBN: 0-88936-556-3

Technical editor: W.M. Carman

A microfiche edition is available.

Abstract

This publication presents the results of an international meeting held in Denpasar, Bali, Indonesia, 24–29 July 1989, that focused on the use of shrubs and tree fodders by farm animals. Through 26 papers, the workshop addressed feed-resource availability, use by ruminants and nonruminants, processing methodology, economics, and development issues. These aspects and the current knowledge on shrubs and tree fodders were further highlighted by country case studies detailing prevailing situations and policy matters. A special session was held to discuss the successful development and results achieved in the three-strata forage system in Indonesia. The workshop concluded with important working group discussions on the priorities for further research and development, and on the potential for the wider use of shrubs and tree fodders in the developing world.

Résumé

Cette publication présente les résultats d'une rencontre internationale tenue à Denpasar, Bali, Indonésie, du 24 au 29 juillet 1989 et qui a porté sur l'utilisation des arbustes et fourrages végétaux par les animaux d'élevage. Les 26 communications qui y ont été présentées traitaient de la disponibilité des ressources alimentaires pour les animaux, de leur utilisation par les ruminants et les non-ruminants, des méthodes de transformation, des aspects économiques et des questions du développement. Ces sujets et les connaissances actuelles sur les arbustes et les fourrages végétaux ont ensuite été étudiés plus à fond dans le cadre d'études de cas de divers pays exposant les circonstances particulières de chacun et les questions liées aux politiques. Une séance spéciale a porté sur la mise en place et les résultats des systèmes de production de fourrages végétaux en trois strates en Indonésie. L'atelier s'est terminé par d'importantes discussions des groupes de travail sur les priorités de recherche et de développement pour l'avenir et sur les possibilités d'utilisation élargie des arbustes et des fourrages végétaux dans les pays en développement.

Resumen

Esta publicación presenta los resultados de una reunión internacional celebrada en Denpasar, Bali, Indonesia, del 24 al 29 de julio de 1989, y la cual centró su atención en la utilización de forrajes elaborados a partir de arbustos y árboles para alimentar a animales de granjas. En 26 trabajos presentados al seminario, los participantes abordaron temas tales como la disponibilidad de recursos alimentarios y la utilización de los mismos por rumiantes y no rumiantes, metodologías de procesamiento y cuestiones de economía y desarrollo. Estos aspectos y el conocimiento que se tiene actualmente sobre los forrajes de arbustos y árboles se vieron subrayados aún más por estudios de casos por países en los que se detallaron situaciones existentes y cuestiones de políticas. Se celebró una sesión especial para discutir el desarrollo y resultados exitosos alcanzados en Indonesia con el sistema de forraje de tres niveles. El taller concluyó con importantes discusiones de los grupos de trabajo sobre las prioridades existentes en el campo de la investigación y el desarrollo y sobre el potencial que encierra la amplia utilización de arbustos y árboles en el mundo en desarrollo.

Contents

Session IV: Country Case Studies

Session V: Processing, Methodology, and Economics

Communication aspects and research extension linkages of the three-strata forage system in Bali

N.K. Nuraini

Department of Extension, Faculty of Animal Husbandry, University of Udayana, Denpasar, Indonesia

Abstract *— A course on the three-strata forage system was given at Singaraja, regency of Buleleng, Indonesia, from 12 to 14 December 1988. The participants of the course were farmers from Kubutambahan, Sukasada, and Grokgak districts. Three TSFS (three-strata forage system) demonstration plots were built, one plot for each of the districts, by the course participants with the help of the TSFS team. Pretest and post-test data showed that the knowledge scores of the participants were significantly higher ($P < 0.01$) after the course (89.1 vs 79.2, 12.5% increase). The attitudes of the farmers attending the course were significantly more positive ($P < 0.01$) than nonparticipants.*

Résumé *— Un cours sur le régime à trois espèces fourragères (RTEF) a été donné à Singaraja, dans la régence de Bulelung, Indonésie, du 12 au 14 décembre 1988. Les participants étaient des paysans des districts de Kubutambahan, de Sukasada et de Grokgak. Trois parcelles de démonstration RTEF ont été établies, une pour chaque district, par les participants avec l'aide de l'équipe RTEF. Les données recueillies avant et après le test ont montré que les connaissances des participants étaient sensiblement plus élevées après le cours ($P < 0,01$) qu'avant (89,1 contre 79,2, soit une augmentation de 12,5 %). L'attitude des paysans participants était beaucoup plus positive ($P < 0,01$) que celle des paysans n'ayant pas participé au cours.*

Resumen *— Del 12 al 14 de diciembre de 1988, se impartió en Singaraja, territorio de Buleleng, Indonesia, un curso sobre el sistema forrajero en tres capas. Los participantes de dicho curso fueron granjeros provenientes de los distritos de Kubutambahan, Sukasada y Grokgak. Con la ayuda del equipo TSFS, los asistentes al curso hicieron tres parcelas de demostración del TSFS, una para cada uno de los distritos. Los datos previos y posteriores a la prueba demostraron que los participantes obtuvieron calificaciones significativamente más altos ($P < 0,01$) después del curso (79,2 antes del curso, 89,1 después del curso, para un aumento del 12,5%). Las actitudes de los granjeros asistentes al curso fueron significativamente más positivas ($P < 0,01$) que las de los que no participaron.*

Introduction

For farmers in the dryland farming area of Bali, cattle feeds are a major problem, especially during the dry season. The problem exists because of

inadequate knowledge, a lack of special land for planting, and the fact that the bare land after harvesting the cash crops is not used effectively to prepare livestock feeds (Nitis, Lana, Suarna, Sukanten, Putra, and Arga 1988).

The three-strata forage system (TSFS) experiment on the Bukit Peninsula, southern Bali, began in October 1984. The research indicated that TSFS produced 90% more feed, 71% higher carrying capacity and could handle a higher stocking rate than the non-three-strata forage system (NTFS). This allows TSFS farmers to spend more time in social activities and gain more profit than NTFS farmers (Nitis 1986).

TSFS has been expanded to Nusa Penida and Seraya, eastern Bali, because of the initiatives of the government, FPP (Foster Parent Plan) Bali, and the private sector (Nitis, Lana, Suarna, Sukanten, Putra, Nuraini, and Arga 1988). To date, there are 175 TSFS units (Nitis et al., this volume).

One aspect of the TSFS study that has not yet been carried out is the impact of communication support on the TSFS adoption rate of farmers. Accordingly, TSFS demonstration plots were set up at three districts of the Buleleng regency to study the impact of TSFS communication. The objectives of this study were as follows:

- Examine the knowledge and attitudes of farmers toward TSFS.
- Evaluate the impact of communication support on TSFS adoption by farmers and the way this support diffuses to the farmer's social system.
- Study the pattern of TSFS communication in the three villages studied.

Site selection

The Buleleng regency was chosen because no TSFS program had been undertaken in its dryland farming areas. Three districts in the dryland farming system were chosen as the sites of TSFS introduction. In choosing the research sites, the TSFS team was assisted by the head of the Buleleng Regency Animal Husbandry Service because of his familiarity to the area.

Farmer selection

The TSFS team, together with the head of Buleleng Regency Animal Husbandry Service, asked the assistance and permission of the heads of the villages in which the TSFS program would be launched, to select the farmers for the TSFS training course and to develop the TSFS demonstration plot in their villages. Fourteen farmers (seven farmers, seven immediate relatives) were selected from each of the three districts; these were the "nucleus farmers." The farmers selected for training owned their own land and farm.

The training course

Course activities

A three-stage course was arranged to ensure that the farmers could understand and follow TSFS step by step. The TSFS team also regularly gave advice during the project. The mass media (e.g., radio programs) also served as a vehicle for communication.

The first stage of the training course was carried out from 12 to 14 December 1988. The other two stages of the course will be carried out in February 1989 and July 1989. There were 46 participants at the first stage:

- 14 farmers from Grokgak district,
- 14 farmers from Sukasada district,
- 12 farmers from Kubutambahan district, and
- 6 field extension officers, 2 from each of the three districts.

The distance to each district is 40–60 km. All of the participants stayed in the two hotels in Singaraja, close to the location of the training course.

Before the course began, each participant received the *Three Strata System Management Practical Guidance* brochure, a T-shirt and cap with the TSFS logo, a notebook, and a pencil. On the 1st day, presentations were made on the following topics:

- livestock development policy for Buleleng regency,
- the concept and development of TSFS,
- land preparation and planting the cash crop, and
- planting the grass, legume, shrub, and trees.

There was a discussion after each talk, giving the participants an opportunity to deeply understand each topic.

On the 2nd day, the participants returned to their respective districts, with four TSFS teams for each district. With the help of the TSFS teams, the participants practiced aspects of the topics they were taught the previous day. This "learning by doing" approach will help the participants easily understand TSFS. The following activities were carried out: mapping the land for the TSFS demonstration plot; preparing the land for cash crops, grasses, legumes, shrubs and trees; and planting the shrubs and trees.

Supervised by the TSFS team, the grasses and legumes were planted in Sukasada district on 20 December 1988, and on 10 January 1989 in Grokgak and Kubutambahan districts. The delay occurred while awaiting rainfall to give enough moisture for establishment.

The questionnaire

A questionnaire on various aspects of TSFS was given to each participant. It was intended to assess their knowledge before and after the course. There were 30

questions, each with three possible responses. The score given to the most expected answer was 3; the second-most expected answer was scored 2; the least expected answer was scored 1. The questionnaire was completed with one open question with the maximum score of 10. Therefore, the maximum total score for the questionnaire was 100. Total scores were classified by modifying the formation of frequency distribution of Dajan (1972): 0–36, very low; 37–52, low; 53–68, medium; 69–84, high; 85–100, very high.

An attitudinal questionnaire was given to each respondent in the first survey (14 April 1989). In each district, 15–16 farmers were randomly selected from the village where the demonstration plot was built as a control group. The questionnaire consisted of 28 statements. Each farmer was asked to respond to each statement and to grade this response from 1 to 5: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree.

The attitude score of the respondent toward TSFS is the sum of the scores from all statements. Therefore, the maximum score of the respondent is 140. The total attitude score of each respondent was classified as follows: 0–36%, strongly disagree; 37–52%, disagree; 53–68%, neutral; 69–84%, agree; 85–100%, strongly agree.

The data collected in the first stage has been analyzed descriptively. The statistical analysis has been done for the knowledge and attitude scores of the respondents.

Results

Education level

The average age of the participants was 27.7 years, ranging from 16 to 50 years (Table 1). The level of formal education of the participants was either primary school, secondary school, or high school. All the field extension officers had finished vocational high school. Most of the participants from Grokgak and Sukasada districts had attended or finished primary school; most of the participants from Kubutambahan district had finished high school (Table 2).

Knowledge levels

The pretest average score of the participants was 79.2 (high); average post-test score was 89.1 (very high). Therefore, the course improved knowledge scores by

Table 1. Age of participants.

Age (years)	District			Total
	Grokgak	Sukasada	Kubutambahan	
16–25	11	9	11	31
26–35	5	4	2	11
36–45	0	2	1	3
46–50	0	1	0	1
Total	16	16	14	46

Table 2. The level of formal education of the participants.

Education level	District			Total
	Grokgak	Sukasada	Kubutambahan	
Primary school	11	10	1	22
Secondary school	3	3	1	7
High school[a]	2	3	12	17
Total	16	16	14	46

[a] Includes two field extension officers in each district.

Table 3. Pre- and post-test average scores of the participants based on their district.

District	Pretest		Post-test		Improvement (%)	
	A	B	A	B	A	B
Grokgak	71.1	73.1	81.8	83.6	15.0	14.4
Sukasada	84.5	85.1	91.4	91.8	8.2	7.9
Kubutambahan	79.3	79.5	91.6	92.0	15.5	15.7

Note: A, farmer participants only; B, including the field extension officers.

12.5% (increase varied from 7.1 to 16.7) (Table 3). The results showed that the higher the level of formal education, the higher the pretest score.

Effect of location and status

The pretest scores of the participants from Sukasada district was 85.1 (very high); Grokgak district, 73.1 (high); Kubutambahan district, 79.5 (high). Post-test scores of the participants from Sukasada and Kubutambahan districts were 91.8 and 92.0, respectively (very high); Grokgak district, 83.6 (high). These differences were statistically significant between pretest and post-test scores for all districts ($P < 0.05, P < 0.01$).

Attitudes toward TSFS

The results indicated that the course participants had a more positive attitude toward TSFS than the nonparticipants for all districts (Table 5). The attitudes of the course participants varied from "agree" (Kubutambahan, 78.8%; Grokgak, 80.9%) to "strongly agree" (Sukasada, 87.2%). For nonparticipants, attitudes varied from "disagree" (Grokgak, 50.9%) to "neutral" (Kubutambahan, 57.6%) to "agree" (Sukasada, 73.1%).

Discussion and conclusions

The knowledge scores of the participants were generally high before the course. Farmers read the course material, which they received the night before the course, at their leisure. Competition among participants from different districts had some impact on these knowledge levels. After the course, average knowledge scores increased significantly. Therefore, the objectives of the training course, to improve the knowledge of the participants and extend knowledge on TSFS, were achieved.

Table 4. Pre- and post-test average scores of the participants based on formal education.

Education	Pretest	Post-test	Improvement (%)
Primary school	73.5	85.7	16.6
Secondary school	80.6	86.3	7.1
High school[a]	82.9	94.1	13.5
High school[b]	82.6	93.4	13.1

[a] Including the field extension officers.
[b] Farmer participants only.

Table 5. The attitudes of the respondents toward TSFS.

District	Attitude score[a]		Mean difference	*T* value[b]
Kubutambahan				
Participants	110.3	(78.8)	29.6	2.89
Nonparticipants	80.7	(57.6)		
Sukasada				
Participants	122.1	(87.2)	19.8	4.40
Nonparticipants	102.3	(73.1)		
Grokgak				
Participants	113.3	(80.9)	42.0	4.00
Nonparticipants	71.3	(50.9)		
Three districts				
Participants	115.6		24.6	5.92
Nonparticipants	91.0			

[a] Values in parentheses are percentages.
[b] For all values, $P < 0.01$.

The course participants had a more positive attitude toward TSFS than the nonparticipants, because of their access to information. Among nonparticipants, those from Sukasada district had more favourable attitudes toward TSFS compared with those from Kubutambahan and Grokgak districts. The head of the village in Sukasada district was eager to motivate his farmers to get involved in demonstration plots and attend meetings with the TSFS team. Therefore, Sukasada district farmers received more information and knowledge than the farmers from the other two districts.

References

Dajan, A. 1973. Pengantar Metode Statistik Deskriptif. Lembaga Penelitian, Pendidikan dan Penerangan Ekonomi dan Sosial, Jakarta, Indonesia. 451 pp.

Nitis, I.M. 1986. Three-strata system for cattle feeds and feeding in dryland farming area in Bali. 3rd year progress report. International Development Research Centre, Ottawa, Ont., Canada. 197 pp.

Nitis, I.M., Lana, K., Suarna, M., Sukanten, W., Putra, S., Arga, W. 1988. Kursus Peternakan Sapi dengan sistem tiga strata. Fakultas Peternakan, Jurusan Nutrisi dan Makanan Ternak, Universitas Udayana, Denpasar, Indonesia. 122 pp.

Nitis, I.M., Lana, K., Suarna, M., Sukanten, W., Putra, S. Nuraini, K., Arga, W. 1988. Petunjuk praktis tata laksana sistem tiga strata. Kerjasama antara IDRC dengan Universitas Udayana. Fakultas Peternakan, Jurusan Nutrisi dan Makanan Ternak, Denpasar, Indonesia. 33 pp.