EXTENSION PROGRAM ON THE CONTROL OF BOVINE FASCIOLOSIS IN WEST JAVA, INDONESIA

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ABSTRAK

MARTINDAH, E., A. KUSUMANINGSIH, S. WIDJAJANTI, S. PARTOUTOMO, B. FRANK, dan SUHARDONO. 1998. Program penyuluhan dalam upaya pengendalian fasciolosis pada sapi dan kerbau di Jawa Barat, Indonesia. *Jurnal Ilmu Ternak dan Veteriner* 3(3): 206-213.

Program penyuluhan dalam upaya pengendalian fasciolosis telah dilaksanakan melalui kerjasama antara Balitvet, Dinas Peternakan Kabupaten Sukabumi dan Kecamatan Surade serta peternak sapi di Kecamatan Surade, Jawa Barat. Materi penyuluhan merupakan hasil penelitian terdahulu tentang epidemiologi fasciolosis di Surade, yang merekomendasikan 4 strategi pengendalian penyakit, yaitu: (1) tidak menggembalakan sapi/kerbau di sawah yang dekat pemukiman atau kandang sapi pada saat panen; (2) hanya memotong jerami padi pada 2/3 bagian atas, bila jerami ini akan dipakai sebagai hijauan untuk sapi/kerbau; (3) mencampur kotoran sapi/kerbau dengan kotoran ayam/itik yang secara alami telah diinfeksi *Echinostoma revolutum*, bila kotoran ini akan digunakan sebagai pupuk; (4) pengobatan dengan *triclabendazole* cukup satu kali setahun, yaitu pada bulan Juli atau sekitar 6 minggu setelah panen pada musim tanam terakhir. Survei pertama dilakukan pada bulan Januari 1996 untuk menentukan/menetapkan tingkat pengetahuan peternak tentang fasciolosis. Kemudian penyuluhan dilakukan pada bulan Pebruari segera setelah dilakukan penanaman padi pada musim tanam terakhir di empat desa. Dalam penyuluhan digunakan berbagai media seperti pembagian *leaflet* kepada setiap peternak, pemasangan poster di tiap desa, dilanjutkan dengan penyuluhan dan diskusi kelompok peternak pada tiap desa. Rekaman dalam bentuk kaset yang berisi wawancara antara peternak dan petugas penyuluhan diberikan kepada setiap kelompok peternak di tiap desa. Selain itu, penyuluhan disiarkan juga melalui stasiun radio setempat. Pada bulan Agustus dilakukan survei terakhir untuk mengetahui adanya peningkatan pengetahuan dan perilaku peternak terhadap fasciolosis setelah diberi penyuluhan. Dalam menganalisis setiap tahap kegiatan digunakan hirarkhi Bennett. Berdasarkan analisis tersebut diketahui bahwa hanya 2 strategi pengendalian penyakit yang dapat diterima peternak, yaitu memotong jerami padi 2/3 bagian atas jika akan digunakan sebagai pakan ternak dan tidak menggembalakan sapi/kerbau di sawah dekat pemukiman atau kandang sapi pada saat panen. Dua strategi tersebut dari segi sosial dan ekonomi lebih menguntungkan dibandingkan dengan 2 strategi lainnya.

Kata kunci : Pengendalian fasciolosis, program penyuluhan, sapi, kerbau

ABSTRACT

MARTINDAH, E., A. KUSUMANINGSIH, S. WIDJAJANTI, S. PARTOUTOMO, B. FRANK, and SUHARDONO. 1998. Extension program on the control of bovine fasciolosis in West Java, Indonesia. *Jurnal Ilmu Ternak dan Veteriner* 3(3): 206-213.

An extension program to control fasciolosis in cattle and buffalo was undertaken in collaboration with officers of the District of Livestock Services (DLS) and farmer organizations in the Surade district of West Java. Control strategies were based on results of extensive epidemiological studies on fasciolosis in this area over the past 4 years. Recommendations included: (1) preventing animals grazing harvested rice fields adjacent to a village or cattle pen; (2) feeding stock only the top two-thirds of freshly cut rice stalks; (3) mixing cattle or buffalo faeces with manure of ducks or chicken naturally infected with *Echinostoma revolutum,* before using them as fertilizer in rice fields; and (4) a single treatment with triclabendazole in July, about 6 weeks after harvest of the last seasonal rice crop. Farmers were surveyed in January 1996 to determine their level of knowledge about fasciolosis. The extension program commenced in February, soon after planting the second seasonal rice crop in four villages. At first, leaflets were distributed to farmers, and posters were displayed in each village to provide basic information. Following discussions with village leaders, groups of farmers met in each village to discuss the advantages they saw in each strategy, ways they could implement them, and to identify socio-economic constraints that needed to be overcome. Taped interviews were prepared for a local radio station and the farmer groups. In August, final survey was conducted to determine the change in knowledge and attitudes that had occurred as a result of the extension program. Bennett's hierarchy was used at each stage to evaluate the effects of inputs and activities. Farmers adopted the techniques of cutting and feeding rice-stems 2/3 above water-level, and isolating cattle from rice-fields during harvest time, as these appeared to be beneficial in

social and economic terms; but they rejected the two other practices where they perceived that socio-economic costs exceeded benefits.

Key words : Fasciolosis control, extension program, cattle, buffalo

INTRODUCTION

About one-third of the cattle and buffalo population in Indonesia are infected with *Fasciola gigantica*, resulting in the production loss of the animals. However, because the disease is common and unspectacular, the clinical signs of reduced weight gain, fertility and draught power output caused by infection with *F. gigantica* are often regarded as the norm or attributed to poor nutrition.

The distribution of *F. gigantica* depends on the presence of lymnaeid snails. *Lymnaea rubiginosa* is the only intermediate host of *F. gigantica* which caused fasciolosis in ruminants in Indonesia (WIDJAJANTI, 1998). Most *L. rubiginosa* occur in irrigated rice-fields. Snails in rice-fields and drainage ditches adjacent to villages around the district of Surade, West Java, have been infected with *F. gigantica* (SUHARDONO *et al*., 1988; ESTUNINGSIH and COPEMAN, 1996) released in dung washed from cattle and buffalo pens. In contrast, very few snails from rice-fields and ditches, about 200-300 m from villages were not infected. Most infection in cattle corresponds with the harvest of rice crop between January and June each year. The control of fasciolosis in Indonesian cattle usually is done by using anthelmentic (SUHARDONO *et al*., 1991).

Epidemiological research in Surade has established the significance control of *F. gigantica* in draught cattle (ROBERTS and SUHARDONO, 1996; SUHARDONO *et al*., 1998), but the results has not been communicated directly to farmers and extension officers. This extension program was based on the ACIAR Research Project No. 9123 in order to transfer the knowledge about fasciolosis to farmers, to encourage farmers in adopting fasciolosis control techniques, and to measure the success of the extension program. The strategies control methods found by SUHARDONO *et al*. (1998) from the ACIAR Research Project No.9123 are as follow:

1. Prevent cattle or buffalo grazing in rice fields adjacent to a village or cattle pen after harvest, to reduce the infection of *F. gigantica* metacercariae: Cattle dung (contains eggs of *F. gigantica)* is used as fertilizer in rice fields, especially those near cattle pens and villages. *L. rubiginosa* in these fields have much higher prevalence of infection with *F. gigantica* than those fields further away.
2. Feed only the top two-thirds of freshly cut rice stalks, cut 20-30 cm above water-level, to avoid feeding metacercariae of *F. gigantica*: Cercariae encyst as metacercariae on the immersed lower third of rice stalks or sink to the bottom. Before feeding the lower third of the rice stalks, they should be exposed to sunlight for about 3-5 days to kill metacercariae.
3. Before using cattle or buffalo dung as fertilizer in rice-fields, mix it with duck or chicken manure naturally infected with *Echinostoma revolutum:* The ducks or chicken pen must be built side by side with the cattle pen, so that their faeces will be mixed naturally. This evidence will promote maximum competition between *Echinostoma* and *Fasciola* larvae in snail *L. rubiginosa*. In general, the ducks are naturally infected with trematodes if they were reared extensively. This will promote maximum competition between *Echinostoma* and *Fasciola* larvae in snails *L. rubiginosa.*
4. Treat cattle with Triclabendazole in July, about 6 weeks after harvesting the second seasonal rice crop: About 6 weeks after harvesting the last seasonal rice crop most of the snails died and the metacercariae of *F. gigantica* which left on the rice-fields also died because of the exposed of the sunlight. Thus, the treatment of this moment will give a maximum impact.

MATERIALS AND METHODS

The extension program involved 118 farmers in 4 villages (about 30 farmers per village) in Surade, West Java, and an extension officer from the District of Livestock Services (DLS). First survey was done in January 1996 by using a questionnaire to ascertain the knowledge of those farmers about fasciolosis.

The following extension activities were implemented between February and September 1996:

a. a leaflet on control of fasciolosis was given to each farmer;
b. a poster on control of fasciolosis was displayed in each village;
c. farmer meetings were held in March 1996 in all 4 villages. At each meeting, the four control strategies were described before dividing the farmers into 3 small groups to discuss selected topics and decide how each strategy might be implemented;
d. a discussion with a farmer on control measures was broadcast twice a week for 3 months on local radio;

e. a copy of the radio broadcast recorded on cassette was given to the key farmers in each village.

A final survey was done in August 1996 by using another questionnaire in order to evaluate the farmers' knowledge about fasciolosis and the level of farmers' adoption of the four strategies. The questionnaire incorporated seven sequential steps of Bennett's hierarchy (BENNETT, 1976) to evaluate the effectiveness of the extension program (Figure 1).

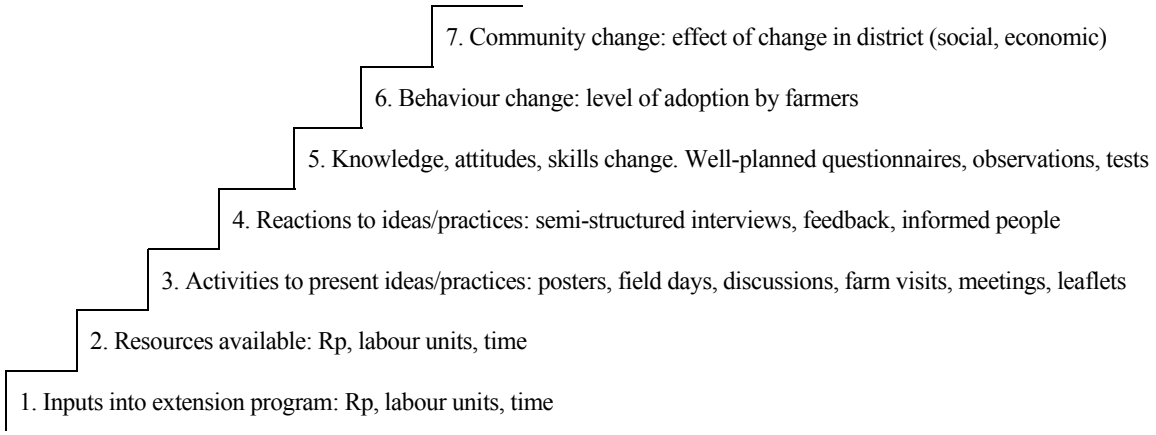

Figure 1. Bennett's hierarchy for evaluating effectiveness of extension activities (BENNETT, 1976)

RESULTS

First farmer survey

In general, the farmers' level of knowledge about fasciolosis was very low (Table 1). Only 22% of farmers surveyed knew about the agent which caused fasciolosis; 15% knew how cattle were infected and 9% considered that infected animals could be treated. The sick animals were usually treated by using traditional medicine.

Only 4.2% farmers surveyed before the extension program reared ducks, while 48.3% reared chickens in conjunction with their cattle or buffalo. None of them mixed faeces from ducks or chickens with dung from cattle or buffalo, either in run-off water from pens or before spreading manure on rice-fields.

Table 1. The percentage of farmers interviewed in each of four villages before the extension program who knew the cause of fasciolosis, the method of infection and effective treatment

Knowledge about:	Percent (%) of farmer in each villages				Average
	Cidahu	Cipeundeuy	Wanasari	Kadaleman	
Causal agent	37.00	11.00	20.00	20.00	22.00
How cattle infected	23.00	4.00	20.00	13.00	15.00
Treatment	13.00	11.00	10.00	3.00	9.25

Extension activities in the four villages

The outcome of the four village meetings for each objective is summarized in Table 2, and described below.

1. Prevent cattle and buffalo grazing in rice-fields adjacent to a village or cattle pen after harvest, to reduce their risk of ingesting metacercariae:
   Farmers from 3 villages said that they would not graze their cattle in rice fields adjacent to villages during harvest, and for one month afterwards.

2. Feed only the top two-thirds of freshly cut rice stalks to avoid feeding metacercariae:
   Farmers in 3 villages said that they were able to include an extra step to cut the harvested straw 20-30 cm above water-level; while farmers in a fourth village said it was difficult to advise their labours to change their harvesting procedure.
3. Before using cattle or buffalo dung as fertilizer in rice fields, mix duck or chicken manure with it:
   Mixing avian and bovine faeces was difficult for all farmers. Emphasis had been placed on ducks, but as very few farmers kept them, they considered ways that ducks could be included in their farming system. One group got some itching problem from a previous duck trial done by SUHARDONO *et al*. (1998), and was opposed to keep ducks.
4. Treat cattle with *triclabendazole* in July to give excellent control: Most farmer groups wanted to use anthelmintics, and asked about the price and is availability.

After the extension program was implemented, farmers' knowledge increased in terms of the causal agent and how cattle were infected (Table 3). The control strategies of cutting rice stems and prevent grazing were well understood (except in Cipeundeuy), but only one-fifth of farmers knew about the influence of rearing ducks or chickens. Villagers varied in their knowledge about treatment with anthelmintic.

The most effective means of transferring information were meetings (80%) and radio broadcast (70%). Leaflets, cassette-tapes and posters were the least effective methods for transferring information (Table 4).

Table 2. Summary results of the extension meetings in 4 villages in the Surade, West Java

Practice	Villages			
	Cidahu	Cipeundeuy	Kadaleman	Wanasari
No grazing in rice-field adjacent to village during and 1 month after harvest	Gp I & II : graze in crop area not in the rice-fields	Not recorded	Gp I & II: agree not to graze in the rice-fields	Farmers agree not to graze cattle in rice-fields
Cut straw 20-30 cm above water-level	Gp II: as harvest done by labours is hard to ask them to cut straw as advised I & III : OK	All groups agree to cut rice-stems 20-30 cm above water-level.	All groups agree to cut rice-stems 20-30 cm above water-level.	All farmers agree to cut rice-stems 20-30 cm above water -level.
Mix duck or chicken faeces with cattle or buffalo dung	All groups will try to keep ducks, but cost is problem Gp III: suggest a saving system to raise money	Keeping ducks will require extra work Gp III: asked DLS to provide credit and supply ducks	Gp I: Buy eggs and hatch as cheap way to establish. Gp II: to save some money to buy ducks and keep in cattle-pen Gp III: worried about extra work and cost to feed ducks	Do not want to keep ducks as recommended, because ducks faeces causing itch, from previous experience
Anthelmintic	Groups I & II: will pay for anthelmintic Group III: drug was hard to obtain	Group I: want to buy drug if available Gp II: would use drug if supplied free Gp III: asked DLS to supply at cheap price	Gp I: cannot buy drugs Gps II & III: want to know how and where to obtain drugs	All farmers want to use the drug

Table 3. The percentage of farmers interviewed in 4 villages after the extension program who knew the cause of fasciolosis, method of infection and control strategies (The number in brackets shows the percent increase over data in Table 1)

Knowledge	Villages				Average
	Cidahu	Cipeundeuy	Wanasari	Kadaleman	
Causal agent	100.00	92.90	100.00	100.00	98.23
	(+63.00)	(+82.90)	(+80.00)	(+80.00)	(+76.23)
How cattle infected	89.30	92.90	78.60	84.30	86.28
	(+66.30)	(+88.90)	(+58.60)	(+71.30)	(+71.28)
Control strategies:					
Cut rice	85.70	85.70	92.90	100.00	91.08
Prevent grazing	78.60	42.90	85.70	93.80	75.25
Rearing chicken/ducks	21.40	28.60	14.30	12.50	19.20
Treatment	64.30	21.40	57.10	81.30	56.03

Table 4. The proportion (%) of farmers in 4 villages which ranked from each of five methods as having a high (H), moderate (M) or low (L) level of effectiveness for communicating information about fasciolosis

Media	Villages				Average
	Cidahu	Cipeundeuy	Kadaleman	Wanasari	
Meeting					
L	12.50	0.00	14.30	5.40	8.05
M	23.40	3.60	5.60	3.60	9.05
H	64.10	96.40	80.30	91.00	82.95
Radio					
L	6.20	23.20	10.70	19.60	14.93
M	6.20	41.10	7.10	7.10	15.38
H	87.60	35.70	82.20	73.30	69.70
Cassette					
L	31.20	92.80	73.20	57.10	63.58
M	25.00	7.20	5.40	12.50	12.53
H	43.80	0.00	21.40	30.40	23.90
Leaflet					
L	75.00	72.90	85.80	78.60	78.08
M	18.80	10.70	7.10	21.40	14.50
H	6.20	46.40	7.10	0.00	14.93
Poster					
L	61.00	71.40	48.20	41.10	55.43
M	18.80	26.80	46.40	48.20	35.05
H	20.20	1.80	5.40	10.70	9.53

Only 2 of the four recommended strategies were accepted by farmers: cut the top two-thirds of harvested rice stalks to feed cattle, and prevent grazing from the rice field adjacent to villages or cattle pen (Table 5). Although most of the farmers said that they like to use anthelmintic, this outcome still depends on the information about cost and availability. Farmers were less likely to integrate ducks or chickens with their penned cattle.

Most of the work in the rice-fields labour was done by the male member of the household (Table 6). He is responsible in cutting the top 2/3 off the rice stalks, and in preventing cattle from grazing the rice-fields for a month after harvest. The female member and children also contributed on a small amount, which varied between villages. In mixing the faeces of cattle and chickens was only done by the males.

Table 5. Summary of farmers' response (%) to the 4 control strategies

Objectives	Villages				Average
	Cidahu	Cipeundeuy	Wanasari	Kadaleman	
Prevent grazing in rice-field at harvest	92.90	100.00	92.90	93.80	94.90
Cut & feed top 2/3 rice-stalks	85.70	100.00	85.70	75.00	86.60
Integrate duck or chicken faeces with cattle effluent	35.70	50.00	57.10	75.00	54.45
Treatment with anthelmintic	100.00	85.70	92.90	81.30	89.98

Table 6. The percentage of family members (husband, wife, children) and labours involved in each practice in each village

Objectives	Villages				Average
	Cidahu	Cipeundeuy	Wanasari	Kadaleman	
Prevent cattle grazing rice-fields:					
Husband	85.80	92.90	78.60	87.50	86.20
Wife/child	7.10	7.10	21.40	12.50	12.03
Labour	7.10	0.00	0.00	0.00	1.78
Cut top 2/3 of rice-stems:					
Husband	92.90	92.90	92.90	93.80	93.13
Wife/ child	0.00	7.10	7.10	6.20	5.10
Labour	7.10	0.00	0.00	0.00	1.78
Mix faeces of chickens and cattle:					
Husband	14.30	7.10	21.40	31.30	18.00
Wife/child	0.00	0.00	0.00	0.00	0.00
Labour	0.00	0.00	0.00	0.00	0.00

DISCUSSION

The comparison of results from the pre- and post-extension surveys showed that farmers in all four villages increased their knowledge on fasciolosis and its control. Two activities were acceptable to the farmers and more likely to be adopted. Keeping cattle off rice-fields during and after harvest were easy to incorporate in the farming system and cutting the tops off rice-stems above the water-level and feeding them to cattle. Conversely, integrating chickens or ducks with cattle in pens was more difficult, although most

villages had free-range poultry. Treating cattle with anthelmintic appealed to the farmers, but they had no information about its cost or availability. Therefore, proposed techniques for controlling fasciolosis need to be negotiated with farmers to ensure that they can be integrated into the traditional farming system.

Farmer group meetings and local radio programs were the most effective techniques for communicating and transferring the information to the farmers. Although posters had been displayed in each village for three months, they had not been as effective as verbal communication methods. Copies of the radio cassettes had been distributed to village leaders, but these were not considered effective by most farmers. The cassette may not have been circulated amongst farmers, or played to groups of farmers.

Traditionally, adoption studies have been influenced by the `technology transfer' model (ROGERS, 1983) which assumes that innovations developed by research are good, desirable and will diffuse through a community over time following a sigmoidal curve. It further assumes that the rate of practice adoption is a function of an individual's innovativeness. This model had relevance to rapid post-war growth in developed economies, when simple technologies contributed significant advantages (FRANK and CHAMALA, 1992). However, many failures to adopt increasingly complex technologies have challenged this model (HOLDEN, 1972), and led to appreciation of complex interactions within social systems (ROLING, 1988; CHECKLAND and SCHOLES, 1990).

The participative action model (CHAMALA *in* CHAMALA and KEITH, 1995) describes criteria necessary for effective communication between people at different hierarchical levels in cooperating organizations, in order to negotiate mutually desirable change. People will adopt a practice if they can see that tangible socio-economic benefits exceed costs (FRANK, 1995). In order for adults to learn about desirable practices and develop new skills, they need to be involved or `learning by doing', so that they can exchange information with other interested people and use the new practice or skill if they consider that it has relevance for them.

The effectiveness of research can be improved by involving all interested people from the outset, so that they develop a sense of `ownership'. Active involvement improves the relevance of research objectives if potential users and agents of change are able to interact with researchers in the planning stages, using a common language (CHAMBERS *et al*., 1989). There is a wide range of participative techniques (CARMAN and KEITH, 1994) for use with collaborative extension methodologies (CHAMALA and KEITH, 1995). The efficiency and effectiveness of the extension process can be evaluated qualitatively and continuously by generating criteria in an interactive action learning process (BENNETT, 1976; MORTISS, 1993; PATTON, 1987; KEMMIS and MCTAGGART, 1988).

CONCLUSIONS

Farmers' knowledge on the control of fasciolosis get increase after the extension program was implemented. Radio broadcast and extension meeting are effective media for transferring information. More than 80% farmers could adopt 2 of 4 strategies which are recommended, those are the techniques of cutting and feeding rice steams 2/3 above water-level, and isolating cattle from rice-field during harvest time. Although most of the farmers like to use anthelmintic, this outcome still depends on the information about cost.

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