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Farm operations management

By H. E. Fels, Adviser, Sheep and Wool Branch, and A. W. Hogstrom, Rural Economist

The main defence of Australian farmers against the cost-price squeeze has been to increase productivity. The tendency is to run more and more stock per man and to grow more crop per man. In Western Australia the ratio of sheep to men on sheep farms has increased steadily. It was about 1400 in 1965 and 2000 in 1970 and 1971.

Some farmers run unusually large numbers of animal units per man-year. The operations of 16 such farmers over one year were examined to find out whether it had been profitable for them to reduce labour inputs to such an extent, how they organised their work programmes with so little labour, what techniques they used to speed repetitive jobs, and what problems and weaknesses they found in their managerial systems.

Impressions about personal and business factors that may have led these farmers to run such large numbers of animals per man-year were also gathered.

Farmers studied

Farmers suggested by various informants were contacted and their stock numbers, crop areas, labour inputs and stock management routines checked. These farmers were asked for names of others with unusually large numbers of animals per man.

To avoid over-sampling clients of consultants, and farmers who would have adopted Agricultural Department suggestions, we asked farmer contacts to suggest others who did not employ consultants, or who would think differently from agricultural advisers. We excluded

<table>
<thead>
<tr>
<th>Table I—Summary of labour inputs (1970/71 in most cases), and production (several years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eight Great Southern Farmers</td>
</tr>
<tr>
<td>Animal units per hectare in 1970/71 relative to district averages in 1968/69</td>
</tr>
<tr>
<td>Animal units per man-year in 1970/71</td>
</tr>
<tr>
<td>Hectares of crop per man-year in 1970/71 (excluding sharefarm and contract crops)</td>
</tr>
<tr>
<td>Lambing</td>
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<tr>
<td>Wool per adult sheep</td>
</tr>
<tr>
<td>Sheep deaths, per cent per year</td>
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<tr>
<td>Calving</td>
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<tr>
<td>Crop yields per hectare—Wheat</td>
</tr>
<tr>
<td>Oats</td>
</tr>
<tr>
<td>Barley</td>
</tr>
<tr>
<td>Oilseeds</td>
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</tbody>
</table>

Three of the four Esperance farmers grew oilseeds. They have had average, good and very good crops, respectively.
<table>
<thead>
<tr>
<th>Legend:</th>
<th></th>
<th></th>
<th>Scale</th>
<th>1 man day</th>
<th>5 man days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Contract</td>
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<tr>
<td>Casual Wages</td>
<td></td>
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<tr>
<td>(No labour-swap or part-time family labour on this farm.)</td>
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</tbody>
</table>

**BREAK OF SEASON**

**PASTURE WILTS**

**FEED SCARCITY**

**FLYSTRIKES** (Actual—after crutching, jetting, etc.)

**FLYWAVE SEASON**

**SHEEP jobs**
1. Shear
2. Dip
3. Blowflies
   a. strategic
   b. tactical
4. Mate
5. Lamb
6. Mark lambs (and mules & inoculate 3a, 8)
7. Drench
8. Inoculate
9. Inspect
10. Sort out, move*
11. Fodder
12. Sell sheep

**CATTLE jobs**
13. Mate
14. Calve
15. Brand
16. Drench, spray, inoculate
17. Inspect
18. Sort out, move
19. Fodder
20. Sell cattle

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*Note: The table includes a visual representation of tasks and their completion dates over the months from September 1970 to August 1971.
<table>
<thead>
<tr>
<th>CROP jobs</th>
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</thead>
<tbody>
<tr>
<td>21. R &amp; M, Seed Grading, getting ready</td>
<td>changed clutch in tractor</td>
<td>grading seed in</td>
<td>cropping finished on north farm started on south farm *</td>
</tr>
<tr>
<td>22. Cultivate</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>23. Seed</td>
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<td></td>
<td></td>
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<tr>
<td>24. Spray</td>
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<td></td>
<td></td>
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<tr>
<td>25. Harvest and cart</td>
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<td></td>
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<tr>
<td>26. FARM MAINTENANCE jobs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>27. Waters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Buildings, Fences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. Firebreaks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. Pastures—topdressing etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. Vehicles</td>
<td></td>
<td></td>
<td>wet weather jobs</td>
</tr>
<tr>
<td>32. Firefighting</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>MANAGEMENT jobs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. Gather information about production markets finance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34. Plan—operations finance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. Supervise execution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36. Organise</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>37. Administration</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>38.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. HOLIDAYS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEVELOPMENT jobs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40. Land</td>
<td></td>
<td></td>
<td>ploughed 330 ac new land</td>
</tr>
<tr>
<td>41. Pastures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42. Fixed improvements</td>
<td></td>
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<tr>
<td>NON-FARM ACTIVITIES</td>
<td></td>
<td></td>
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<tr>
<td>Unaccounted</td>
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* This farm comprises two blocks, ten miles apart. Travel time and driving time approximated sixteen man-days in the year.

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This chart illustrates the various jobs and activities involved in farm management and maintenance, including cultivation, seed grading, spray operations, and farm maintenance tasks such as watering, building repairs, and firebreak maintenance. It also highlights the management activities like gathering production data, planning operations, and supervising execution, as well as financial management and administration tasks.

Additionally, the chart accounts for holidays and development jobs, such as land development and pasturing, and non-farm activities that are not accounted for, including visitors and slack time.

*Note: The chart is a visual representation of the workload and time distribution over the year, with specific activities marked by various symbols and lines.*
farmers with whom we had previously discussed how to reduce labour inputs.

To see the situation in drier areas we found four wheat/sheep farmers with fairly high ratios of animals per man and with large crop areas per man.

We also chose four corporate farms, rather than family farms, to see if they differed in any way from family farms.

Collecting information
The 16 farmers were visited, their physical resources, labour inputs and production records were listed and properties, stock, improvements and plant were seen. Main records consulted were copies of statistical and taxation returns, farm maps or airphotos and rainfall and notebook records.

We checked use of extra capital or operating expenses or outside labour as substitutes for the farmer’s and family labour or wages staff; and checked whether maintenance or other aspects of management appeared neglected.

An “animal unit” was a sheep, a lamb or one-eighth of a cattle beast. A “man-year” was the full-time work of a farmer, family member, manager or employee. Fractions of man-years were estimated for family members and employees who worked part time on the farm, except for work in shearing sheds.

Work routines and timing were summarised and in ten cases work diaries were compiled from memory and other records to show the jobs done in the past year, who did them and how long they took.

Work rates were recorded in cases that were remembered clearly or were recorded in writing. We discussed weaknesses in the current management systems, difficulties encountered so far, and plans and doubts for the future. We also enquired about personal and property histories and reasons for running more animals per man.

SURVEY FINDINGS
Production
Table 1 summarises data on stocking rates, animal units and crop areas per man-year, and production per animal or per hectare. Production per animal and per hectare compared favourably with average farms. Stocking rates were 1.5 times district averages. Despite this, lambing and calving percentages were above average and other production levels were similar to district averages.

Profitability
Contractors and outside labour
Most of the 16 had accounting done by outsiders and employed full-contract shearing teams. We do not know proportions of other farmers who employ outsiders for various jobs*

* Of the farmers surveyed, most employed outside accountants and 14/16 used full-contract shearing teams. Other jobs done by outsiders were—

topdressing—8/16
consulting on management—7/16
mulesing—5/16
crutching—5/15 use full contract teams (the rest employ shearsers and perhaps shed hands)
harvesting—4 in wet areas (small crop areas)
full-contract cropping, or sharefarming—3 in wet areas (2/4 corporate farms, 1/8 family farms)
lamb marking—3
pregnancy testing in cattle—2
dipping—1
drenching—1

These figures are inflated by one farmer who is partly crippled and employs contractors for the jobs he cannot do himself. Another used his topdresser and harvester to do contract work for neighbours.

IN BRIEF . . .
The 16 farmers whose management systems were examined in this project averaged the high figure of 6 900 animal units (sheep, lambs, or one-eighth portions of beef animals) plus 141 hectares of crop per man-year and a study of their operations revealed that—

• Production per animal and per hectare generally equalled or exceeded district averages
• Stocking rates were 1.5 times district averages so animal production per hectare greatly exceeded district averages.
• Contractors and outside labour, and capital and operating expenditures, were used to avoid labour but only to the extent that we would expect in farm businesses of similar size.
• Farm maintenance and other aspects of management were not neglected.
• Jobs that yielded doubtful benefits were given up. Work programmes, as well as individual jobs, were organised to save effort and costs and to make the work more effective.
• Times of shearing and lambing varied widely. Points that all sheep work programmes had in common were: all lambs were mulesed at marking time; grazing management systems were simple; all systems used little or no handfeeding, or simplified hand-feeding systems, or substitutes.
• Seven of the farmers had beef sidelines. All heifers and most cows calved on dry feed in autumn to avoid dystocias. Hand-feeding was avoided, minimised or simplified. Grazing pressures appeared generally lighter for cattle than for sheep. The reconnaissance did not indicate whether cattle or sheep need less labour (except for shearing).
• Six were one-man farmers. All employed some casual workers. Three wives gave substantial assistance.
• Two farmers seemed to “overwork”. Others took normal or large amounts of time off. Several emphasised the need to avoid overwork, to allow clear thinking. All who were physically able were willing to work long hours “when necessary”.
• Work rates for repetitive jobs were generally fairly high and ranged as high as we have heard from other farmers.

The factors which limited stock numbers per man appeared to be farm size, the work of flystrike control and the risk of major bodystrike flywaves and, for beef production, the labour requirements to make hay if large quantities of hay are warranted.

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Capital as a substitute for labour
One farm had a conspicuously high standard of capital improvements and machinery and one had conspicuously cheap and old improvements and machinery. Others covered the normal range of cost and quality for farms of comparable size.

One manager emphasised a need for fenced raceways to help move cattle. No other farms had fenced raceways except past holding paddocks near the homestead.

Work diaries and enquiries suggested no unusual expenditures to avoid work.

Maintenance
Almost all the farms, improvements and machines appeared well maintained. One farmer considered his low labour input forced him to neglect some maintenance work.

Other aspects of management
Discussions and observations suggested other aspects of management were not neglected. Work diaries showed appropriate times spent on selecting and preparing stock for sale, yarding them for buyers and selling them. Two of the 16 were merino studbreeders and one of these appeared an outstanding marketing manager.

Wool production and marking and lambing percentages suggested the stock were fed about as well as others in their districts or better, even though stocking rates were 1.5 times district average rates.

Work programmes
Times of shearing varied between August and April. Times of lambing ranged from April-May (two stud properties and three others) to August-September. All 16 mulesed all lambs at marking time. All management systems involved little or no handfeeding, or simplified handfeeding systems or substitutes.

Grazing management systems were simple. Most were based on set-stock but none used rigid set-stocking as in grazing experiments. Grazing management usually gave cattle lighter grazing pressures than sheep.

Seven of the 16 ran beef breeding sidelines. Two had entered beef production by hand-rearing calves — without extra staff. None had a clear opinion from experience whether cattle or sheep required more labour. All emphasised the importance of calving on dry feed to avoid dystocias, especially for heifers.

Six were "one-man farmers". They all employed casual workers at times, and three wives contributed 0.2, 0.3 and 0.33 man-years of office work and assistance with light two-man jobs. An example work diary from a one-man farm is shown as Figure 1.

Two farmers seemed to have decided to overwork rather than employ more labour. However, even they had taken three weeks’ holiday in the past year.

Three gave themselves large amounts of time off. Two others had taken time off in recent years to campaign for election to parliament. Two were moderately keen golfers.

Several emphasised the importance of not overworking, to allow clear thinking and thoughtful review of plans, especially during peak labour periods or when things go wrong.

All who were physically able were willing to work long hours "when necessary". For most this meant "at seeding time, shearing time and a few other rush periods".

Seven employed management consultants.

Work study
Work-rates quoted for jobs like drenching sheep, marking and mulesing, jetting, or inoculating, were generally fairly high and ranged as high as we have heard from other farmers (sheep treated per man-day or man-hour).

Crutching
Several had considered or tried annual programmes without crutching. Several were evaluating race crutching and one crutched some sheep in a race. These farmers referred us to others—with 3000 to 7000 animal units per man but not included in the survey—who race-crutched their sheep each year using an air-driven shearing handpiece, or dagging shears.

Handfeeding
Simplified handfeeding systems or substitutes included grain or legume crops for weaners in summer; saved dry pasture, standing or mown, for autumn-calving cows; and on a stud property where ewes and cows were fed grain almost to appetite, a tip-truck, stopwatch and notebook.

Sheep yard design
One management consultant and his clients had studied sheep yard design systematically. One design worked with outstanding ease. A suggested key point was that sheep-holding yards should not be used as passageways to move sheep. Another was that forcepen areas can be designed specifically as passageways, using favourable curves and corners to encourage sheep movement.

Management problems
Flystrike
For most of the 16 farmers, and all in wetter areas, the work of flystrike control and/or the risk of a major bodystrike flywave “made it hard to run more sheep per man” or in some cases made the farmer “feel insecure with present numbers per man”. Part-way through the first contact stage of the investigation we noted that all contacts had mulesed all their sheep. Thereafter we asked all contacts and informants if they knew any farmers who ran more than 3 000 sheep per man without mulesing. We heard of two who ran about 3 000 per man, shearing before the spring flywave, without mulesing, and knew of another who ran more than 7 000 per man, not all mulesed.

Shearing
For some surveyed farmers the annual costs of shearing-shed work equalled the annual costs of all other labour for the year (allowing award rates for farmers and family members).

Cattle sidelines
Several with cattle sidelines noted that peak labour requirement for conventionally-managed cattle would be for haymaking. A one-man farmer could make hay for 100 cattle but not for 1 000. For mixed farmers the labour-peak to
make hay for cattle would coincide with the main flywave risk period. Six of the farmers who ran cattle used little or no hay or silage and the seventh used grain. Management to avoid dystocias, and grazing management favouring cattle rather than sheep have been mentioned.

**Personal and business factors**
Most had been brought up on farms or stations as sons of owners or major shareholders. Three were city-reared but would have been brought up with management-level ambitions.

Four or five would have grown up in prosperous families; the rest on relatively modest farms, usually with debts. Six grew up on the properties they now operate. Two of these would have taken over prosperous properties with moderate debts or debt-free.

Five at least were heavily committed to off-farm interests—business, political, or producer-organisations.

One is a diabetic, likely to collapse if he works hard. He employed a full-time worker. One of the one-man farmers is partly crippled. He employed contractors for work he could not do himself.

Three of the wheat-growing farms had been almost fully cleared for 10 years or more. All others were developed from virgin land or part-cleared farms in the late 1950's and 1960's.

Discussions suggested the main motives for running unusually large numbers of stock per man were: desire to clear debts quickly; desire for more personal and family income; desire to "do the job well" using criteria of efficiency and profitability; desire for more time for other interests; desire to avoid friction with employees by avoiding unimportant work and by employing fewer men.

The management systems that gave the owners large amounts of time-off for other interests seemed among the most effective. Willingness to overwork rather than employ an extra man appeared a "weakness". Keenness to avoid work by culling jobs, thoughtfully, seemed to lead to simpler and more effective management systems.

**Conclusions**
We conclude that the surveyed farmers in general had increased profits by reducing labour inputs, without reducing production or quality, without using extra capital instead of labour, and without neglecting maintenance or other aspects of management.

Annual routines of work were well planned but were not new. They involved a wide range of times of shearing and of lambing.

In general the farmers surveyed consider why they do various jobs and how successful each job is in achieving its objects. They have identified the jobs that are most worth doing—that yield most benefit per unit of effort and cost. They have given up jobs that yielded doubtful benefits. They organise work programmes to save effort and costs and to make the work more effective. That is, they have used principles of work study to simplify their work programmes and make them more effective.

The surveyed farmers, in general, had increased their profits by running unusually large numbers of animals per man. Not many farmers have enough sheep or pasture to run more than 6 000 sheep, but all farmers can consider culling jobs to save work. This will give them more time to think and plan, to do more of their own wool clip preparation, to take on extra sidelines on the farm, to take off-farm employment or simply to give them more time for leisure.

**Acknowledgments**
We appreciated and enjoyed the keen co-operation of the farmers involved. Direct costs of the study were covered by Meat Research Trust Funds.

**QUESTIONS FOR FUTURE RESEARCH**
Problems and weaknesses involved in the management systems examined suggest questions for research workers as well as for farmers, managers and advisers.

We should expect these questions to become more pressing if animal numbers and crop areas per man continue to increase as they have in the past.

We suggest a list of such questions should include:

- **Sheep**: The scope to select fleecerot-resistant sheep for use in wet areas? The need to dip in very short wool to avoid dip-scald as a factor predisposing to "mycotic dermatitis"? How to control bodystrike waves when there are no effective insecticides? Whether to prolong the useful life of future insecticides by limiting their use in the sheep industry? Other opportunities to limit or control flystrike?

- **Fodder conservation**: The roles of conserved feed and handfeeding in beef production? Work study and engineering development work on making, storing and handling hay.

- **Woolclip preparation**: What are the technical objectives of woolclip preparation for processing? Can marketing systems be adapted so clips prepared solely for processing will sell as well as clips prepared "for sale"? Work study on ways to achieve simplified clip-preparation objectives.

- **Training for management**: Attitudes to work? Awareness of work-study and operational-research concepts? Willingness to plan and to constantly review plans?