THE GROSS OUTPUT AND NET RETURNS FROM AGRICULTURE IN DIFFERENT REGIONS OF AUSTRALIA

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The gross and unsubsidized net agricultural production from the major Australian farming regions have been calculated from data collected by the Bureau of Agricultural Economics. The results suggest that the wheat and sheep zone is the most important farming region, producing one third of the nation's agricultural gross revenue and one half of its agricultural net output. Important contributions to gross and net agricultural output are also made by the pastoral and high rainfall sheep zones. Because of the high level of subsidy, the dairying zone makes no contribution to net output although it produces fifteen per cent of the nation's gross agricultural revenue. Australia's irrigated lands produce approximately ten per cent of national gross and net agricultural output.

The Bureau of Census and Statistics currently publishes estimates of the value of gross and net output from agriculture in Australia on both a state and a nation-wide basis. However, the states are political units and bear no relation to the natural climatic regions of Australia which in turn determine the nation's specialized farming zones.

As Australian agriculture is normally considered on an industry basis, an estimation of the gross and net output produced in each farming zone within each state would be a far more useful guide to policy makers than an estimate for the whole state. Such information could be used in determining the additional gross and net output which might be obtained by adopting a particular policy for a particular industry or region.

The nature and location of Australia's farming zones were described in an earlier issue of this journal [1] when the profitability of farming and the efficiency of resource use in each of the zones was estimated from the economic surveys of farming carried out by the Bureau of Agricultural Economics. The basis of these surveys, the degree to which they are representative of each particular farming zone and the periods of time

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[1] B. R. Davidson, "The Comparative Profitability and Efficiency of Agriculture in Different Regions of Australia". *Review of Marketing and Agricultural Economics*, Vol. 35, No. 4 (December, 1967), pp. 179–206.

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over which they were conducted has already been described in the earlier paper. Essentially each survey consists of a sample of farms which is selected in such a way that it is representative of the farming in a particular region. These surveys can be used to calculate the value of gross and net output for each of the farming zones.

1 THE VALUE OF GROSS OUTPUT

The gross revenue from agriculture in any farming zone could be estimated by calculating the average gross output per acre of land farmed from the B.A.E. surveys and multiplying this by the number of acres in the zone which the sample represents. This method assumes that farms in the surveys were selected because they were typical of the type of land utilization in the region they represent. However, farms in the B.A.E. surveys were selected on a basis of having the same distribution of numbers and types of livestock or areas of the major crops as the zone they represent. In these circumstances a far more accurate assessment of gross output is likely to be obtained if the average gross revenue per animal and per acre of crop in the B.A.E. sample for each zone is multiplied by the number of acres of each crop and type of livestock in the zones. The value of outputs obtained in this way can then be summed to obtain the total output of the zone. In adopting the latter system it is assumed that the output per animal of each type and per acre of each crop variety in the B.A.E. sample is typical of the zone it represents. It is not assumed that the average output per acre of land in the sample is typical of the region.

The values of gross output in the B.A.E. surveys were at farm gate prices after marketing costs have been deducted. This is comparable with the "local values" of agricultural products calculated by the Bureau of Census and Statistics. One of the disadvantages of using the B.A.E. surveys as a basis for estimating gross and net output is that they were carried out over different periods of time. This disadvantage can be reduced by indexing the individual items of cost and revenue in each year of the survey to the common year 1964–65, using the B.A.E. Index of Prices Received and Paid by farmers in each state.

A further difficulty arises because the B.A.E. has not conducted surveys of the Northern Beef Zone, nor all of Australia's irrigated lands, nor the sugar producing areas. In Victoria, the value of output of all irrigated land is calculated by the State Rivers and Water Supply Commission. In New South Wales and Queensland, the value of gross output from approximately two thirds of the area of irrigated land is calculated by the State instrumentalities responsible for irrigation.[2]

[2] *Annual Report of the Water Conservation and Irrigation Commission of N.S.W.*, 1964–65; *Annual Report of the Victorian State Rivers and Water Supply Commission*, 1964–65; *Annual Report of the Commission of Irrigation and Water Supply, Queensland*, 1964–65.

The gross output of the remaining irrigated land in these two States was calculated by assuming that the output per acre of each individual crop and pasture is the same as in the area already measured. The output from the small area of land irrigated in South Australia was calculated by assuming the output per acre of each crop and pasture was equal to the average of the same crops and pasture in N.S.W. and Victoria. In Western Australia, most of the irrigated land in the south of the State is used for dairying, and an estimate of its output was obtained by assuming it is the same as for irrigated dairying land in Victoria. The output from individual irrigation schemes producing cotton, such as the Ord River and the Namoi River, can be assessed from separate surveys carried out in these regions.[3]

As economic surveys have not been carried out in the Northern Beef Zone, its output was calculated by summing the local value of agricultural output from the Northern Territory (as calculated by the Bureau of Census and Statistics for 1964–65) and the estimated output from north-western Western Australia and northern Queensland. In the Western Australian portion of the zone it was assumed that the output per head of cattle was the same as in the Northern Territory. In the Queensland section of the zone it was assumed that the output per animal was the same as Pastoral Zone of Queensland, except in the wetter shires of the coast on the borders of the Queensland Dairying and Sugar Zones. In these shires it was assumed that the output per head of livestock and per acre of crop was the same as in the neighbouring Dairying Zone.

The value of gross output calculated on this basis for the year 1964–65 could vary from the true estimate because of differences in seasonal conditions between that year and the year in which the surveys were carried out. A detailed examination of yields per animal and per acre for each region indicated that the only serious discrepancy between yields for the years in which the surveys were carried out and the yields obtained in 1964–65 was from wheat. This discrepancy was corrected by calculating the average output that would have been obtained if the average wheat yield of 1964–65 had been obtained during the period of the survey.

The total value of gross output for the different farming regions and for the whole of Australia calculated in this way are shown in table 1. As the value represents the value of all farm produce at farm gate prices, the accuracy of the calculation can be checked by comparing it with the total local value of agricultural production calculated by the Bureau of Census and Statistics. The total of the two estimates were within one per cent of each other. A more detailed examination can be made by comparing the local value and the value of gross output calculated from the B.A.E. surveys for individual commodities in each State.

[3] R. W. Cumming, "Economic Survey of the Australian Cotton Growing Industry, 1964–65 to 1966–67: Some Initial Results", *Quarterly Review of Agricultural Economics*, Vol. 21, No. 4 (October, 1968), pp. 210–230.

When this comparison was made, wider discrepancies were observed. The largest discrepancies occurred between commodities which formed a small proportion of the total output of a State, and in no State did total agricultural revenue calculated for the B.A.E. surveys differ by more than 10 per cent from estimates made by the Bureau of Census and Statistics. In these circumstances it was decided that a more accurate estimate might be obtained by assuming that the Bureau of Census and Statistics estimates for each commodity in each State were correct and distributing this between the zones within the State in the proportions indicated by the gross output calculated from the B.A.E. surveys. The results of this calculation are shown in table 1. The difference in the proportion of total output from any one region does not vary by more than 2 per cent whichever method is used.

TABLE 1

The Value and Proportion of gross output produced by Australia's Agricultural Zones, 1964–65

Zone	Estimates based on B.A.E. surveys		Estimates based on Bureau of Census and Statistics data	
	$ million	%	$ million	%
Pastoral	293·0	10·6	272·7	9·9
Wheat and Sheep	885·7	32·1	855·2	31·0
High Rainfall Sheep	489·0	17·7	507·3	18·5
Dairying	418·4	15·2	455·0	16·5
Irrigation	319·1	11·6	319·1	11·6
Northern Beef	95·7	3·5	88·0	3·2
Sugar	99·3	3·6	99·3	3·6
Dryland fruit, vegetables and tobacco*	158·0	5·7	158·0	5·7
Total	2,758·2	100·0	2,754·6	100·0

* Includes irrigated crops where water is not obtained from State reservoirs.

Table 1 reveals that almost one third of Australia's gross agricultural revenue is produced in the wheat and sheep zone. This is more than twice the output of any other zones except the High Rainfall Sheep Zone, and is more than the sum of any other two farming zones. The Pastoral, Wheat and Sheep and High Rainfall Sheep Zones account for over 60 per cent of Australia's agricultural production. The better watered Dairying and Irrigation Zones account for less than 30 per cent, and the contribution of the Northern Beef and the Sugar Zone is extremely small.

2 THE VALUE OF NET OUTPUT

The contribution of agriculture in each region to the nation's wealth can only be measured if the net output from each region is calculated. In calculating net output it is essential that all costs of producing gross output are deducted and that any transfers of wealth to the region in the form of subsidies are removed. Net output can be defined as unsubsidized gross revenue less all operating and fixed costs, including the labour of the farmer and his family and the depreciation of farm assets, but excluding interest on the farmer's capital. Unsubsidized gross revenue is the revenue farmers would receive if all farm produce consumed in Australia were sold at import parity price and if exported products were sold at export parity price. An estimate of the net output defined in this way can be calculated by multiplying the gross output of each farming zone by the ratio between the value of unsubsidized net output and the gross output per farm in each of the surveys carried out by the B.A.E. In the irrigation areas, the net output from each particular industry survey by the B.A.E. must be summed to find the total net output from all land irrigated from state reservoirs.

As economic surveys have not been carried out in the Northern Beef and the Sugar Zones or in the fruit and vegetable and tobacco industries, these regions and industries must be excluded from the calculation. The sugar and tobacco industries are so heavily subsidized that their contribution to net output is probably negative. As the production of the Northern Beef Zone and of all fruit and vegetables is only 18 per cent of the gross output of Australian agriculture, it is possible to calculate the contribution to net output of a high proportion of Australia's agriculture including that of all of the major farming zones.

The net output from each farming zone calculated in this way and the proportion it forms of the total net output of the nation, excluding beef from the Northern Zone and fruit and vegetables, is shown in tables 2 and 3. These contrast strongly with the value of gross outputs produced from each zone. The net output of the Pastoral, Wheat and Sheep and High Rainfall Sheep Zones is 92 per cent of the total agricultural net output, although these zones only produce 60 per cent of the nation's agricultural gross output. The Wheat and Sheep Zone alone produces almost half of the net agricultural output from the major farming zones. On the other hand, the overall net output of the dairying zone is negative and the contribution of irrigated lands is only 8·4 per cent of total agricultural net output. The removal of subsidies reduces the contribution to national wealth of the dairying and irrigated zones, but it has little effect on the sheep and wheat and beef industries. This gap between the contribution to gross and net output by the different farming zones is widened further because resources are used more efficiently in the Pastoral and Wheat and Sheep Zones and, consequently, net output forms a higher proportion of gross output in these regions than in the other farming zones.[4]

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[4] Davidson, *op. cit.*

TABLE 2

*Value of gross and net output from the major Australian farming zones, 1964–65**

Zone	Value of gross output	Unsubsidized net output as a percentage of gross output	Value of unsubsidized	
			Net output	Proportion
	(A)	(B)	(A x B)	
	$ million	%	$ million	%
PASTORAL—				
Queensland	135·7	19·0	25·78	6·5
N.S.W.	99·6	32·2	32·07	8·1
South Australia	18·7	27·8	5·20	1·3
Western Australia	18·7	23·7	4·44	1·1
Total	272·7		67·49	17·0
WHEAT AND SHEEP—				
Queensland	73·0	21·5	15·69	3·9
N.S.W.	419·1	23·7	99·33	25·0
Victoria	129·9	17·9	23·25	5·8
South Australia	130·2	18·3	23·82	6·0
Western Australia	103·0	31·9	32·86	8·3
Total	855·2		194·95	49·0
HIGH RAINFALL SHEEP—				
Queensland	..	..	..	..
N.S.W.	141·0	21·0	29·61	7·4
Victoria	248·1	19·3	47·89	12·0
Tasmania	32·7	14·5	4·75	1·2
South Australia	23·5	20·1	4·73	1·2
Western Australia	62·0	26·1	16·17	4·1
Total	507·3		103·15	26·0
DAIRYING—				
N.S.W.—				
North Coast	43·5	−29·6	−12·88	−3·2
Hunter and Manning ..	40·9	6·2	2·53	0·6
Cumberland and South Coast	37·9	7·5	2·84	0·7
Victoria—				
Western and Wimmera ..	21·9	−8·8	−1·92	−0·5
Central and North Central	32·3	0·05	0·02	<0·1
North Eastern	14·5	2·0	0·30	0·1
Gippsland	61·1	3·5	2·14	0·5

Table 2—*continued*

Zone	Value of gross output	Unsubsidized net output as a percentage of gross output	Value of unsubsidized	
			Net output	Proportion
	(A)	(B)	(A x B)	
	$ million	%	$ million	%
Queensland—				
Cairns, Townsville and McKay	1·4	−1·7	−0·02	<−0·1
Rockhampton and Maryborough	32·2	4·5	1·45	0·4
Moreton	19·4	−15·1	−2·94	−0·7
Downs and Roma ..	22·0	−3·8	−0·84	−0·2
South Australia—				
Central and Lower North	34·5	20·4	7·04	1·8
South Eastern and Murray	46·0	−4·4	−2·02	−0·5
Western Australia	16·1	0·4	−0·06	<0·1
Tasmania	31·1	7·3	2·27	0·6
Total Dairying ..	454·8		−1·63	−0·4
IRRIGATION—				
Sheep	37·6	35·2	13·24	3·3
Cattle	15·5	35·3	5·47	1·4
Wheat, Oats and Barley ..	55·3	35·6	1·89	0·5
Dairying	80·8	6·5	5·25	1·3
Cotton	7·6	8·5	0·65	0·2
Rice	8·3	33·7	2·80	0·7
Vines	42·2	−2·7	−1·14	−0·3
Other crops	15·0	35·6	5·33	1·3
Total	212·2		33·49	8·4
Total of Major Agricultural Zones ..	2,302·2		397·46	100·0

* Excluding Northern Beef and all fruits, vegetables, sugar and tobacco.

Two thirds of Australia's agricultural net output is produced in the Pastoral and Wheat and Sheep Zone, an area with an average rainfall of less than 30 inches. The remaining one third is produced in the nation's better watered High Rainfall Sheep and Irrigated Zones. While some dairying regions contribute to net output, others make no contribution to the nation's wealth and have to be supported by transfers of wealth from other sections of the economy.

TABLE 3

Value of Gross and Net Output of Major Australian Farming Zones, 1964–65

Zone	Value of gross output	Value of unsubsidized net output	Proportion %
		$ million	
Pastoral	272·7	67·49	17·0
Wheat and Sheep	855·2	194·95	49·0
High Rainfall Sheep	507·3	103·15	26·0
Dairying	454·8	−1·63	−0·4
Irrigation	212·2	33·49	8·4

The dry Pastoral and Wheat and Sheep Zones of Australia not only use resources more efficiently than the better-watered regions of Australia but also produce the major portion of the nation's net income earned by agriculture.