

**Commodity
Costs and Returns
Estimation
Handbook**

A Report of the AAEA Task Force on Commodity Costs and Returns

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CHAPTER 9

JOINT COSTS, GENERAL FARM OVERHEAD, AND RIGHTS TO PRODUCE

JOINT COSTS

Definitions

Joint production costs have been defined in the economic literature as costs that "are incurred on groups of products rather than on individual and separate ones" (Hopkins and Taylor: 404). At least three different situations give rise to joint costs. These include (1) expenses incurred in the production of joint products (defined as technically interdependent commodities arising from a joint technology), (2) expenses for inputs that affect the production of more than one enterprise (independent but organizationally related commodities) even if the production technologies are non-joint, and (3) outlays for production inputs that are either purchased for the farm as a whole or are used for the entire set of production activities undertaken by the farm. The second category is best exemplified by the allocation of capital inputs (and/or their services) or fixed expendable inputs to different enterprises. For example, the total amount of fertilizer applied by the firm is usually divided among several different crops. Or the total number of tractor hours is divided between crop and livestock operations. The third category is usually referred to as general farm or business overhead and typically includes items for which it is difficult or impossible to determine the impact of the input on either output or cost for a specific enterprise. For example, it is difficult to determine the impact of buying a new set of Allen wrenches on the average corn yield per acre or the impact of attending pesticide applicator training on cucumber gross returns. Each of the three situations may give rise to joint costs that occur either as direct costs or as indirect costs. *Direct costs* are defined as those costs that can normally be associated with a specific enterprise though not necessarily with individual products generated by the enterprise. *Indirect costs* are those costs which may apply to several enterprises or production cycles. Some inputs such as fertilizer or lime, which are normally viewed as direct costs to a given enterprise, may have an intertemporal or residual carry-over dimension that may affect the production of multiple enterprises. Individual expendable and capital inputs may fall in either or both of the direct and indirect cost categories.

Overview of Issues

The three situations identified above involve the sharing of resources either among various enterprises or among unique products generated by a single enterprise. As has been well documented in the literature, the allocation of shared resources and their associated costs among products makes the process of developing a separate cost estimate for individual products highly complicated (Gilliam; Boulding). In fact, Hopkins and Taylor wrote in their 1935 treatise on "Cost of Production in Agriculture" that "The nature of joint costs...dooms any effort at their apportionment" (Hopkins and Taylor: 404). Nevertheless, a variety of computational methods has been used to allocate joint costs in order to provide cost and return (CAR) estimates for specific products. These estimates may be needed for use in a variety of purposes ranging from farm management to applied commodity program analyses.

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PRODUCTION COSTS FOR JOINT TECHNOLOGIES AND ALLOCATED COSTS OF PRODUCTION FOR NON-JOINT TECHNOLOGIES

Enterprises were defined in Chapter 2 as any coherent portion of the general input-output structure of the farm business that can be separated out and analyzed as a distinct entity. The purpose of defining enterprises is to allow analysis of that enterprise. The most common enterprise definitions involve one output and the inputs used to produce that output as is the case with non-joint technologies. Note, however, that the multiple outputs produced with a given technology may be spatially or intertemporally differentiated forms of the same product rather than distinct outputs. Such outputs must usually be handled in a joint product framework rather than as non-joint products and the input allocation methods used must account for these spatial and time differences. Enterprise CAR estimates allow a static analysis of that enterprise for a point in time that involves one production period. Because of this static analysis, an enterprise CAR estimate will only be valid if the enterprise is in a stable or nongrowth mode. Crop enterprises should not reflect levels of fertilizer application which tend to "warehouse" nutrients, nor should they reflect resource "mining." Livestock enterprises should show a culling rate that only will maintain herd size and not reflect growth or entrenchment.

In the case of non-joint technologies, inputs and their associated costs are tied directly to an individual enterprise and may not require any procedure for allocation. The most common problems arise with inputs that are purchased on a whole-farm basis and where records are not available on allocations of these inputs to individual operations. Common examples of allocated inputs include family labor, machine time, multipurpose buildings, and sometimes fertilizer or agricultural chemicals. It is important in estimating these costs that the sum of the allocated costs add up to the total costs for the whole farm or operation.

Even when the technology is inherently joint, as in the case of corn and soybeans in rotation, it is often possible to accurately allocate specific inputs to one crop or the other as would be the case with seed. However, those production inputs that affect multiple enterprises in a complex way should be allocated to the appropriate enterprise according to the marginal factor costs associated with each respective enterprise. The allocation of fertilizer expense in the case of a corn-soybean rotation is a good example of where the allocation is not completely straightforward. The allocation of pasture costs to a calf and to a cull cow is rather arbitrary and in determining the cost of feed used to maintain a ewe for one year, the allocation of costs between the production of wool and the production of a feeder lamb is ludicrous.

Costs that require allocation to more than one enterprise due to residual or secondary value (intertemporally) to the second enterprise can include both expendable inputs and certain capital or durable inputs. Expendable inputs should be used in an enterprise at the level required by that enterprise to maintain the specified level of production. Any amount of unused input which results in a residual benefit to a second enterprise should be reflected as a cost to that second enterprise and a reduction of cost to the first enterprise. Again, enterprise CAR estimates should reflect only sustaining levels of input use.

Two situations exist in terms of the benefits of an input to more than one enterprise. The first is where full expected benefits have accrued to the first enterprise but residual benefits will also accrue to the second enterprise. An example would be planting alfalfa on land which will be followed by a nitrogen-using crop that benefits from the nitrogen-fixing characteristics of alfalfa. The second is where both enterprises benefit from use of the input, but this use is not mainly associated with one enterprise. An example would

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be fencing that exists between a pasture used for cattle and a wheat field from which cattle are to be restricted.

In the first situation there is an advantage to the crop that follows alfalfa but only to the point at which the additional nutrients available are mined by the following crop. That residual value will disappear if not used by the second crop. The appropriate value to be used for the residual benefit (in this case nitrogen) is the opportunity cost of acquiring that benefit from the next best available means of obtaining it.

In the second situation both enterprises benefit from the input and its cost should be allocated based on the value to each enterprise. In the example, there is no question that both enterprises benefit, but the benefit to the wheat decreases if it were not next to the pasture, and in a totally wheat area, the value could become negative due to the need to maintain fence areas where they would not be otherwise necessary.

Jointly used inputs can be allocated to separate enterprises by several methods. The allocation process can be based on use as determined by acres, hours, dollars, times over, number of units, or some other appropriate measure of use. Values should reflect the marginal factor cost of the input to that particular enterprise. The cost can be based on either opportunity cost or market cost methods. Opportunity cost should reflect the value of that portion of the input used by the enterprise in its "next best" use. Market cost should reflect the value of the portion of the input used if the input were purchased for use on the market.

Allocating the costs of such expendable cost items as fertilizer, chemicals, fuel, lubricants, and repairs for machinery can be accomplished fairly directly based on the use of these inputs by the individual enterprises. Allocation of costs such as depreciation of equipment or land rent also can be done using procedures that have been generally accepted such as hours of use or acres planted, though there may need to be some "fine-tuning" of these processes. For some assets it is difficult to develop an acceptable allocation procedure—for example, fencing between oats and bermuda pasture grazed by cattle. Are the cattle being kept in the bermuda pasture or are they being kept out of the oats? Each situation needs to be analyzed according to the area. If it is generally a pasture area, then the cost of the additional fencing for the oats should be charged to the oats, but if the area is generally tilled, then the charge for the additional fencing should be charged to the bermuda pasture. In other words, the generally accepted practices of the area must be considered in allocating such costs.

In summary, most production costs for non-joint technologies can be allocated to an enterprise, if the enterprise is considered to be in a sustaining position. This reduces the effect of warehousing or mining by the enterprise. If inputs are applied for use by a second enterprise, the marginal factor cost of the input should be charged to that second enterprise and not to the first enterprise. Machinery and equipment inputs have well-defined processes (i.e., acre-trips, machine hours, etc.) for the allocation of their costs across enterprises.

The Task Force recommends that costs of production for joint technologies be estimated for the technology as a whole allowing for multiple outputs in the enterprise definition. In cases where there is a need to estimate costs for individual outputs such as for corn and soybeans in rotation, the Task Force recommends that costs be allocated on an objective basis involving information on input allocations and input levels that neither warehouse or mine inputs.

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In the case of non-joint technologies, the Task Force recommends that the costs of inputs be allocated based on objective data on individual enterprise use. The Task Force recommends the use of data on land allocations, hours of use, acre-trips, pounds applied, etc., to determine these allocations. If objective data on the allocation of inputs between enterprises is not available, the costs of these inputs should be excluded, should remain unallocated, or in rare instances allocated following the guidelines pertaining to general farm overhead expenses.

GENERAL FARM OVERHEAD EXPENSES

General overhead costs associated with operating a business are usually incurred at the total farm level, across all enterprises, although in some instances these costs can be assigned to groups of products. Examples include liability insurance, subscriptions and dues, accounting and legal fees, shop tools, equipment storage, road maintenance, and so forth. Allocation of these shared costs to individual enterprises is often difficult or impossible in anything but an arbitrary manner. Managers, however, often must make decisions on individual enterprises, based on CARs for producing those enterprises. In such situations, it may become necessary to use some procedure that allocates overhead costs across the appropriate enterprises. Several methods have been developed that are somewhat effective in this task. These methods are based on information from surveys or from mathematically described algorithms that approximate their impact on the enterprises.

A wide variety of methods are used in practice to account for and allocate overhead expenses. Evidence suggests that approximately 75% of the CAR estimates prepared by economists at land grant universities include an estimate of property taxes on land or equipment, and approximately 90% include charges for property insurance. Almost without exception, an opportunity interest on operating capital is included. Only about one-half of the states include business overhead costs such as office expenses or attorney fees in their CAR estimates (Klonsky, 1992: 150). The United States Department of Agriculture (USDA) includes an estimate of taxes and insurance on machinery and real estate used in production as well as an estimate of general farm overhead expenses. The USDA's general overhead cost category includes expenses to purchase such items as general farm utilities (as opposed to utility expenses for practices such as drying or irrigation that are attributable to a specific enterprise), farm shop and office equipment, supplies, drainage, accounting and legal fees, road and fence maintenance, business travel, dues, and membership fees. The USDA also includes interest expenses incurred on both operating loans and loans secured by real estate.

When overhead costs have been included in CAR estimates, a variety of methods has been used to allocate them to specific enterprises. The more common allocation methods are presented below. Most of the methods that have been used imply that the overhead costs included in CAR estimates have been derived from observed whole-farm revenue and expense data. In practice, however, this may not have been the case for, as Klonsky observed, "Fixed operating costs are sometimes collected from farmer surveys. Alternatively, they are estimated as a percent of variable operating costs or as a percentage of the value of equipment" (Klonsky, 1992: 152). Given the variety of expense items that have been included in estimates of overhead costs along with the large number of methods used to prorate these costs among commodities, it is to be expected that the allocation of indirect expenses is viewed as a difficult and highly contested aspect of CAR estimation (Klonsky, 1989).

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Economics of the firm indicates that the profit-maximizing amount to produce of any one commodity is found by substituting among enterprises until the marginal rate of product substitution equals the inverse ratio of net revenues (Boehlje and Eidman). Or, stated differently, the firm is "to be regarded as seeking to maximize the difference between expected receipts and variable costs" (Friedman: 109). This decision rule maximizes net returns to the limited resources. Thus, the choice of which and how much of an enterprise to produce depends on the enterprise's relative contribution to these fixed factors of production. Consideration of fixed general farm overhead or fixed cash expenses is not relevant in arriving at management decisions related to types or optimum amounts of an enterprise to produce (Miller and Skold). Instead, the net revenues from enterprises produced by the firm are available to cover these fixed expenses.

Overhead expenses (once incurred) have no effect on enterprise selection or production decisions, and any method chosen to prorate these expenses to a specific enterprise is usually arbitrary.

The Task Force generally recommends excluding estimates of general overhead expenses from enterprise CAR estimates when those costs cannot be allocated on an objective basis. When allocation is necessary to compute the total costs of production for a specific enterprise, however, the method chosen should be enterprise neutral; i.e., enterprise selection or production decisions made after this allocation coincide with those made before the allocation. This recommendation has the effect of minimizing the impacts of tenure and use of debt capital on estimates of enterprise costs.

It is recognized that general farm overhead and other allocated overhead cost items such as machinery depreciation or establishment costs of multiyear enterprises are important considerations in establishing cash flow estimates for farm businesses. Nonpayment of these costs, particularly taxes and interest, would result in the firm's being in default. Thus, the CAR estimator may want to provide additional information to help data users better interpret cost and return data for their purposes. For example, data showing the combinations of enterprises produced and the degree of specialization of farms in conjunction with data showing how general overhead and fixed payments vary would help the data user better understand a farm's ability to meet both its cash and noncash obligations.

COMMONLY USED METHODS FOR ALLOCATING JOINT COSTS

Methods used to allocate expenses among products, or spatially or intertemporally on a given product, depend greatly on other management information used on the farm. If a farmer keeps detailed records of the use of various farm resources, those records will likely form a good basis for allocation. However, these types of records are usually not kept, so other allocation indicators must be used. Following is a description of some of the costs that are commonly allocated among enterprises, what measures are best suited for each type cost, and their limitations. Joint and non-joint technologies are considered along with general farm overhead items. Some of these costs may not require allocation, as they are often calculated directly for the respective enterprise. For example, land rent and machinery costs are frequently directly attributable to specific enterprises.

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Land

The cost of land usually includes rents, property taxes, opportunity cost of owned land, and any maintenance required to sustain the productivity of the land such as terracing, soil additives, and covers. The allocation of land cost across enterprises is usually straightforward; i.e., it is divided across enterprises on the basis of how much land each enterprise uses. In some instances, land cost may take on different values depending on the quality of the land and its use. For example, land in permanent pasture or in a cattle feedlot likely has a different value from land in constant tillage or planted to trees. Therefore, allocation of land cost may be a multiple stage process—first allocating total farmland cost among the major categories of land, then allocating each category among those enterprises using each category. Associated with access to land, buildings, and corrals are roads and alleyways. The costs of the land required and annual maintenance for these should be allocated based on the percentage of use by each enterprise. For example, the cost of maintaining a road between the feed bins and the cattle corral should be charged primarily to the cattle enterprise even though it may be used to get to one of the sorghum fields. Chapter 7 contains a more detailed discussion of issues related to the estimation of the costs of land.

Machinery

Machinery costs include capital recovery of machinery investment, fuel, lubricants, and repairs. Where machinery items are enterprise specific (e.g., cotton strippers, grain buggies, peanut diggers, or hay balers), related machinery costs can be allocated to the respective enterprises. However, most farm machinery, particularly tractors, is used across multiple enterprises. A commonly used method of allocating these costs is acre-trips. That is, for each enterprise, multiply the number of machinery practices used by the number of acres in the enterprise—then allocate across enterprises using each enterprise's portion of total acre-trips on the farm. One problem that arises using this method is that it assumes all tillage practices are equal in cost. Enterprises that utilize only light tillage, therefore, are allocated a disproportionately high machinery cost relative to enterprises that use heavy tillage. Another method that somewhat addresses this problem is to allocate on the basis of custom rates or machinery costs calculated using agricultural engineering models. Using this method, each tillage practice for an enterprise is initially expensed using these cost proxies. The actual total farm machinery expenses are then allocated using each enterprise's share of total calculated or custom rate expense. As discussed in Chapters 5 and 6, the operating and capital costs of most machines can be estimated on an hour of use basis. These costs are then appropriately allocated to alternative enterprises based on hours of use (heavy tillage requires more hours) for the tillage operations associated with the enterprise.

One common expense that is difficult to allocate is the cost of owning and operating a pickup truck that is used for a large number of enterprises. The most important determination is the proportion of the usage that is associated with the farm business as opposed to personal use. Allocation of the business use across enterprises is best done by producer survey or expert opinion. The alternative is to allocate use based on revenue proportions as is sometimes done with general farm overhead expenses.

Property Taxes

Property taxes should be allocated on the same basis used to allocate the use of the property itself. That is, property taxes on land are allocated using the land allocation method, while property taxes on farm

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buildings and equipment are allocated according to the buildings and equipment methods. Property taxes on residences should not be allocated to enterprises at all except to the extent that a portion of the residence is used as a farm office.

Buildings and Improvements

To the extent that buildings and improvements are designed specifically for use by certain enterprises (e.g., swine farrowing facilities, grain bins, and hay storage barns), costs of depreciation, interest, and maintenance of these items should accrue to the enterprises affected. Costs of buildings used to house or repair machinery should be allocated on the same basis as the costs of machinery which utilize these facilities. For example if the tractors take 1/3 of the space in the storage shed and the dry bean enterprise takes 2/5 of the tractor time during the year then the dry bean enterprise could be assigned 2/15 of the cost of the shed for tractor storage time. The beans would also need to be assigned a cost for the space taken up by the planter, the harvester, and so forth that they use. For other nonspecific buildings and improvements, the costs should be allocated as discussed in the subsection on general farm overhead.

Insurance

The method of allocation depends on what type of insurance is being purchased. Property insurance should be allocated on the same basis as is used for the respective property itself. Crop insurance accrues to the respective crops. Health insurance should be allocated using the same basis as is used for labor. Other general farm insurance such as liability insurance can be treated as general farm overhead and allocated as described in a later section.

Utilities

Unless utilities are metered separately for different enterprises, some allocation procedure is required. This allocation usually requires some judgment on the part of the farmer, as it is difficult to use any other cost indicator. One possibility for electricity is to estimate the total motor horsepower or total wattage used by the different enterprises and allocate on that basis. However, given the variability in use, this method is questionable. Without any objective basis for utility allocation, utility expense should be allocated as described later for general farm overhead.

Labor

Allocation of labor depends on how the labor is used. Any labor cost associated with operating or maintaining machinery should be allocated using the same basis used in allocating machinery costs. Other labor, if specific to an enterprise, should accrue to the respective enterprise. Otherwise, any other non-enterprise-specific labor should be treated as general farm overhead. Chapter 8 discusses issues related to the estimation and allocation of labor services.

Management

Generally, management cannot be separated from labor, and any allocation of management costs follows that of labor discussed previously. However, where farms incur management fees, a commonly used

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method is to allocate those fees on the basis of gross income. This creates a problem in that gross income does not often reflect where management is actually devoting its effort. Overall market prices or weather may drive gross income up or down for any given enterprise with no change in what management has done for that enterprise. For example, although 75% of a manager's effort may be devoted to managing one enterprise, favorable weather may have helped a second enterprise to generate 75% of the gross income. A recommended alternative is to allocate management costs on the basis of other allocated costs. It can be argued that managers manage other input resources. Therefore, if an enterprise requires 75% of the other input resources, the manager is more likely to devote 75% of his/her effort to that enterprise than to a second enterprise which may have generated 75% of gross revenue. Chapter 8 discusses issues related to the estimation of labor costs, particularly as they relate to the valuation of operator whether in performing routine technical or decision making functions.

General Farm Overhead

There are some general farm overhead expenses that typically have no reasonably objective method of allocation based on information available to the producer. Subscriptions, dues, accounting and legal fees, business travel and training, general farm liability insurance, and otherwise nonallocated labor, utilities, insurance, buildings and improvements generally fall into this category. Several methods could be used to allocate these costs, but economists often argue that because these costs are not affected by enterprise selection or management, any allocation of these costs should be enterprise neutral. One method that has often been used is to allocate these expenses on the basis of gross value of farm production. An alternative method is to allocate general farm overhead on the basis of other allocated costs. Both of these methods, however, can lead to distortions in enterprise selection and management, as gross enterprise margins (gross income less allocated costs) are impacted disproportionately.

The Task Force recommends when an objective method to allocate general farm overhead is not available the allocation be based on enterprise gross margins. In this way, enterprises are impacted relative to their importance to overall farm profit, and decisions about enterprise selection and management are neutral to general farm overhead expenses.

However, in the instance where an enterprise has a negative margin, this method creates a mathematical problem. In this case, it is recommended that the allocation be made on the basis of long-run expected gross margins or on the basis of other allocated costs.

When including estimates of general farm overhead, the Task Force recommends that CAR estimates include a separate estimate document for the general farm overhead expenses. From this estimate, allocations would then be made to each of the enterprises on the farm.

In making the allocations, the format in Table 9.1 is recommended. This format accomplishes much the same as Schedules 14.6-14.8 of the dairy farm example included in Chapter 14 of this report. The items included in the table are those thought to be general farm overhead expenses, are not easily allocated using objective methods, and are recommended for inclusion in the CAR overhead estimate. As indicated in the footnotes to the table, it is suggested that a different allocation method may be applicable for each type of overhead

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expense, and that the allocation be made on a line-by-line basis. After all overhead expenses are allocated, the totals allocated for each enterprise are then entered into the respective CAR estimates for those enterprises as a single line item input titled "Allocated Overhead." A table similar to Table 9.1 could also be constructed to assist in documenting the allocation of joint costs to enterprises on an objective basis. Such a table might include lines for land, operator labor, family labor, hired labor, tractor time, combine time, irrigation water, fence repair, and so forth. Such a table helps ensure that the sum of enterprise use and cost adds to total use and cost, that all costs are accounted for, and may help the analyst in checking the estimates for consistency with other objective data.

TABLE 9.1 Allocation of Overhead in CAR Estimates

Overhead Item	Whole-Farm	Enterprise 1	Enterprise 2	Enterprise n
Accounting/legal fees				
Advertising				
Computer & related office equipment (annualized costs)				
Education				
Farm office				
Farm organization dues/meetings				
Farm shop (portions could be included in repair cost estimates)				
General use vehicles (farm share)				
Maintenance of general farm facilities				
Property/casualty insurance				
Publications				
Umbrella liability insurance				
Utilities/phone				
TOTAL	Total Farm	Tot. Ent. 1	Tot. Ent. 2	Tot. Ent. n

Note:

- (1) Each line in this worksheet is allocated separately.
- (2) The total for each enterprise is transferred as a single line item input into the respective enterprises.

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RIGHTS TO PRODUCE

Definition

Rights to produce pertain to *incidents of ownership* of resources used in production, the impact of *regulations* governing the use of those resources, *access to markets* for the commodities produced, and *access to enhanced prices or other incentives* associated with market access. These rights generally involve payment of rent, royalties, increased production costs, or foregone production in exchange for benefits of enhanced production or markets.

Overview of Issues

The costs of producing agricultural commodities arise not only from the purchase of production inputs but also from gaining access to resources and markets. In some instances, gaining access comes at additional cost of other inputs. In other instances, gaining access requires payment of a royalty to property right owners. Following is a brief description of the issues concerning rights to produce.

Ownership of Resources

Some resources essential in producing an agricultural commodity are not separately available for purchase in an open market, but are attached to, or a part of, other "host" resources. For example, grazing rights and water rights are often associated with land ownership. Therefore, unless a producer owns the host resource, he/she cannot own the secondary resource. That producer, however, can still access the secondary resource by compensating its owner through the payment of rents, royalties, or easements. At issue is whether, and how, to account for costs of access to these resources.

Regulations on Use of Resources

The use of resources is coming under closer public scrutiny, particularly when that use may lead to degraded water quality, erosion, or other off-farm impacts. Many states have passed laws that govern dairy waste management, for example, which dictate how dairy farmers can operate. These farmers can either pay the cost of complying with the regulations or quit producing milk. Use of certain pesticides has been severely curtailed, often resulting in offsetting costs of other inputs, or degraded productivity. Denying farmers the use of wetlands on their farms may result in degraded productivity. The question here concerns the degree to which such regulations impact costs of production, how those costs can be identified, and whether these costs are capitalized into the cost of other resources.

Access to Markets

Generally, farmers can find a market for almost anything they produce; at least they are not technically prohibited from producing and selling most commodities. However, the marketing of many commodities in the United States such as fruits, vegetables, and nuts is controlled through such techniques as market orders, organic certification, or other quota systems. These market orders usually dictate quality standards and assure the orderly flow of commodities to markets. However, these orders may also be used to control production levels through the use of market quotas. Without a quota, or without the ability to

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produce the quality of commodity dictated by the quota, the farmer has no market. What is the cost of acquiring quotas and what must be given up to produce for the quota (e.g., costs of quality-enhancing inputs) are two questions of market access that must be considered.

Access to Market Enhancements

Many programs exist that provide incentives to farmers who pay the price of participation. Market orders may assure higher, more stable prices for their respective commodities, but require compliance with timing and quality standards. Certain government programs, such as the peanut program, provide support prices for "quota" peanuts, with the rest of the peanuts being sold as "additional peanuts" receiving a significantly lower price. Other government programs offer deficiency payments and access to the Commodity Credit Corporation (CCC) loan programs in exchange for establishing a crop acreage base, idling land, and conserving soil resources. The question arises as to how these costs should be determined, and what are their associated market enhancements.

Estimation Procedures

Costs of rights to produce involve two major components—**costs of acquiring the right and costs of exercising the right**. In any CAR estimate where rights to produce are involved, it is important to define clearly these two types of costs **and to include in returns the benefit derived from these costs**. If costs include access to market quotas, then quota prices should be included in returns. If costs include those associated with government program participation, then government payments and other benefits should be included in returns. If access to water is included as a cost, the yield and/or quality arising from the use of that water should be reflected in the returns. Some general recommendations for estimating costs of rights to produce are provided here, followed by examples of some of the common rights to produce.

Costs to Acquire

Agricultural producers have two ways to acquire rights to produce as defined above. They can purchase them or rent (lease) them. How, if at all, they are explicitly included in CAR estimates depends on this method of acquisition. Where the rights to produce are inseparable from the costs of other resources (e.g., water with land, crop acreage base with land), no attempt to separate them should be made. These rights are usually capitalized into the cost of the other resources. Where the rights are separable from other resources or where they are easily transferable, the costs should either be capitalized separately or charged at a prevailing rental rate.

If it becomes absolutely necessary to identify production rights which are capitalized into other resources, two methods might be used. One method is to estimate the costs associated with gaining those rights. For example, what income was foregone (such as government payments or cash receipts) to increase crop acreage to establish a higher crop acreage base? What costs were realized in establishing conservation measures on a farm? Another method is the approach used in appraisal. That is, identify two resources (e.g., parcels of land) which are alike in all respects except that one includes a production right in its value, while the other does not. According to the market, then, the difference between the prices of the two resources is attributable to the production right.

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Costs to Exercise

Owning (or renting) a right to produce does not always mean that the benefits of that right will automatically be realized. In the case of government commodity programs, ownership of a crop acreage base does no good unless the farmer complies with acreage reduction requirements. Having established an approved conservation compliance plan is not sufficient to derive program benefits if certain maintenance is required to stay in compliance. Having acquired grazing or hunting rights, agricultural producers are often required to perform certain measures or to comply with other restrictions to retain those rights. Maintaining a crop acreage base sometimes means devoting some acreage to a conserving use. In any event, any costs associated with retaining a right to produce or that arise as a condition of benefits of that right should be included as costs of production.

Examples of Determining and Allocating Rights to Produce

Following are some examples of cases where it is important to estimate the rights to produce. A detailed explanation of grazing fees is presented. More general explanations of the other cases are also given. However, the principles discussed within the grazing fees section apply equally to the other examples, as well.

Federal Grazing Fees

Fees for grazing federal lands came into existence in 1906 on Forest Service land and in 1936 for lands currently administered by the Bureau of Land Management (Torell, Bartlett, and Obermiller). The fees can be considered a lease rate on the forage or a tax on pre-existing grazing rights, depending upon one's point of view (Hage). The fees are charged on an Animal Unit Month (AUM) basis. An AUM is described as the amount of forage required to feed a 1,000-pound mature cow and her calf (or equivalent) for one month.

Grazing permits were originally allocated to western ranchers who could meet the "use-priority" and "commensurability" requirements. Use-priority meant that preference was given to those ranchers who were using the federal lands prior to the allocation of grazing permits and commensurability meant that the permit holder was a bona fide rancher who administered sufficient base property (land and/or water) to support the livestock when they were not utilizing the federal rangelands (Gardner). To encourage use and private investment on the rangelands, the original permits were given to ranchers gratis and the grazing fees were set at low levels (Torell and Doll). The difference between the cost of utilizing federal rangelands and the value of the forage was capitalized quickly into the value of the base ranch (Roberts). It has also been suggested by public land ranchers that part or all of the permit's value is not a capitalized rent, but an operating license, because the carrying capacity from the permit allows the deeded ranch property to become an economically viable operation (Torell, Bartlett, and Obermiller). Although this value was a windfall gain to the original owners of the grazing permits, an estimated 85% to 90% of the grazing permits have changed ownership (Nielsen and Workman), with the new owners disbursing some proportion of this capitalized value for the right to utilize federal rangelands.

Federal agencies administering the grazing permits generally do not allow the owners of the permits to sublease them. In order for the grazing rights to be transferred to another rancher, the base property and/or

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livestock associated with the permit also must be transferred. Therefore, no market exists for the direct transfer of grazing permits between parties.

Federal rangeland leases also differ from most private pasture leases in that the users of the federal rangeland provide most, if not all, of the basic inputs associated with using the grazing permit. Costs such as rangeland improvements, fencing, grazing association fees, transporting or trailing cattle to the permit area, and supplemental feeding regimes can differ substantially from costs that would be incurred if the livestock were kept on deeded land or private pasture was leased. These costs can be readily identified and associated with the costs of utilizing federal rangelands.

The variable costs associated with utilizing federal grazing permits (e.g., federal grazing fee, grazing association fees, and transportation costs) can be included with variable costs. Either the capitalized value of the permit can be included in the value of the base property (Alternative 1) or the capitalized value of the range permit can be separated from the value of the base ranch and reported separately (Alternative 2).

Alternative 1. The simplest and most commonly used method of accounting for the value of the federal grazing permit is to include it in the value of the base property. This is usually included in the rental value of the land. By so doing, the value of the grazing permit is accounted for in the CAR estimate, but is not specifically identified. This alternative alleviates the researcher having to undertake additional studies to determine the separate components included in the base ranch value.

Alternative 2. The second alternative consists of separating the capitalized value of the federal grazing permit from the base property and reporting the two separately. The appropriate unit of measurement for reporting would be an Animal Unit Year (AUY), an AUM, or on a per cow basis (Torell and Doll).

This alternative has the advantage of allowing users of the CAR estimate to see explicitly all costs associated with utilizing a federal grazing permit. To do so would necessitate a continual analysis of ranch sales with and without federal grazing rights to determine the current value of the grazing permit. This value would be dependent upon several factors, including the size of base ranch, the percentage of the forage base provided by the grazing permit, and the distance of the base ranch from the permit, and the productivity of the federal allotment.

Other complicating factors associated with valuing the grazing permit include the refusal of public land agencies to recognize the rancher's investment in the grazing permit as a true cost. Banking institutions are also becoming more hesitant to accept federal land grazing permits and leases as collateral for individual loans since a long-standing Forest Service and Farm Credit System Memorandum of Understanding was canceled in 1990 (Budd).

Although it is well established that federal grazing permits add to the value of ranches that have access to these permits (Collins; Fowler and Gray; Martin and Jefferies; Torell and Fowler; Torell and Doll), a market does not exist where grazing permits may be traded among parties unless the base property and/or cattle are also transferred. This makes the job of accurately separating the capitalized value of the grazing

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permit from the value of the base ranch infeasible on a large-scale basis. It is therefore recommended that these two values not be separated, but that a footnote acknowledge that the capitalized value of the grazing permit is included in the value of the land.

Market Quotas

If these quotas are transferable from producer to producer, either directly or through an intervening agency, the purchase cost of the quota should be capitalized or depreciated, depending on its expected lifetime. If the quota is attached to a production unit such as land, no cost of acquisition is separately identifiable and is included in the value of that production unit.

Government Programs

The rights to government farm programs are generally the establishment of a crop acreage base, the acquisition of quotas, or the compliance with certain regulations such as conservation compliance. Establishment of crop acreage bases occur over time through a history of crop production. Although there may be costs associated with establishing that base, those costs are normally capitalized into the value of the land and cannot be identified separately. Likewise, quotas for many government programs are established through production history and may fluctuate over time as the USDA attempts to control production. Again, the costs of these quotas, unless they are readily transferable, cannot be identified explicitly and are usually included in the price of other resources.

Costs of complying with certain regulations to retain eligibility for farm program benefits may include both investment and maintenance costs. The investment costs are likely to be capitalized into the value of land, while the maintenance costs are reflected as additional out-of-pocket costs of production.

Exercising the rights (farm program payments) gained through the establishment of a crop acreage base usually requires devoting some acreage to a conserving use. If the unit production being considered is an acre of crop acreage base, all the costs of exercising that right are included as part of the acre. When this occurs, however, production levels and costs reflect only that portion of an acre to which they apply. If the cost of production being considered is an acre of planted crop, then the commensurate net costs of maintaining the conserving use must be added. As discussed in Chapter 3, *the Task Force recommends that CAR estimates for crops be done on a planted acre basis*. Keeping revenue and cost calculations on a planted acre basis incorporates acreage not in production but needed for that particular production system.

Water Rights

Water rights in the United States have fallen into several categories depending on whether they pertain to surface or ground water (Goldfarb). For the most part, these rights accrue to the land and are capitalized into the land value. In some instances, particularly where appropriative rights laws are in place, water rights have been severed from the land, and are available through a separate water rights market. However, these water rights are currently evolving in many states, as the public becomes more involved in defining them. Hence, the general rule discussed earlier should be kept in mind when estimating costs of production: if the water rights accrue to the land, the costs are likely capitalized into the land value; if the

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rights are readily transferable, or if there is a ready market for water, then the costs of water rights are taken from that market and should be capitalized separately.

CONCLUSIONS

Rights to produce generally provide agricultural producers with access to markets, market enhancements, or resources essential in producing certain commodities. These rights must be both acquired and maintained if the producer wishes to derive any benefits associated with them. Costs of acquisition can either be capitalized costs of purchase or rental of them, while costs of maintaining the rights involve other steps taken to realize the full benefit of those rights or which assure the continued access to those rights. In any event, the benefits of these rights to produce should be accrued to any costs of acquiring and exercising them when developing CAR estimates.

Although it is recognized that many of the items discussed above "should" be included in determining the full economic costs of rights to produce, estimating these is really only feasible at the firm level, if at all. Collecting such information on an aggregate basis is neither feasible nor necessary. Instead, if the approach is taken that commodities are being produced by "going" concerns, many of the costs of acquiring rights to produce are capitalized into the value of other factors of production, particularly land. Therefore, only those rights to produce that are easily transferable should be included explicitly as costs within CAR estimates. In addition, costs incurred in exercising those rights, such as costs of participating in farm programs, should also be included only if farmers actually realize those costs. For example, exercising the right to participate in government farm programs includes protecting or maintaining a crop acreage base. This leads producers to plant the relevant program crop, even if an alternative crop might generate higher short term returns; i.e., an additional opportunity cost of participating in the program. These opportunity costs are difficult, if not impossible, to determine on the aggregate, and should be ignored.

