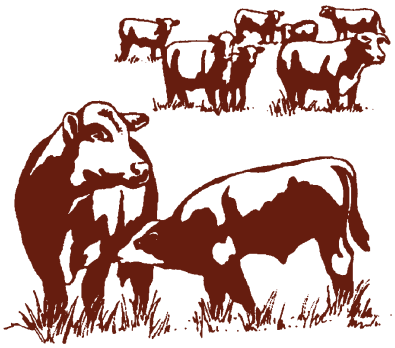

Beef Cattle Handbook

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Consulting Engineers in the Feedlot Industry

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Professional engineers in private practice, the consulting engineers, comprise a reservoir of talent available for prompt design of new or expanding feedlot facilities. This engineering expertise can be utilized in problems involving dairy and feedlot layout, pollution control, feed processing, transportation, occupational safety and other related elements influencing the successful operation of the facility.

Qualifications and Responsibilities

The licensed consulting engineer offers competence in and responsibility for the work he or she undertakes; resources to complete the job in a reasonable time; and honesty in dealing with his clients. The value of consulting engineering services is reflected in the economy of equipment selection and construction expenditures, operating efficiencies, and maintenance costs.

To protect the public welfare, State Boards of Registration for Professional Engineers were established by law to certify and license engineers of proven competence. The term "engineer" in company titles and advertising can lawfully apply only to the services of a registered professional engineer. Practicing consulting engineers must be registered professional engineers in their state of residence and obtain registration in other states in which their services are provided.

The consulting engineer abides by a code of ethics to serve as a faithful agent and trustee of each client in professional matters The consulting engineer is obligated to apply his best efforts within the scope of his training and experience. He cannot, however, guarantee perfection or assume financial responsibility for claims resulting from his work. The best efforts of the consulting engineer, and the greatest benefit to his clients and the public, will be obtained in an atmosphere of trust in the consulting engineer's abilities and adequate compensation for sciences rendered.

Free exchange of goals, objectives, and ideas is strongly encouraged in developing the client-consultant relationship. The engineer should carry the appropriate personal injury insurance or be covered under the client's policies.

Engaging the Consulting Engineer

Selection

The National Society of Professional Engineers has established five broad criteria for the selection of a consulting engineer. These are:

1. Technical qualifications.
2. Reputation with previous clients.
3. Standing within the profession.
4. Experience on similar projects.
5. Availability for the project.

The engineering profession has long considered that competitive bidding, as a tool for selecting an engineer, is generally not in the client's best interest. Rather, qualifications to perform the assigned work have become accepted and acknowledged throughout the United States as the most important factor in obtaining satisfactory engineering work.

The consulting engineer chosen should be request-

ed at the outset to develop a written proposal which describes the scope of engineering services to be performed and the basis of compensation. The reasonableness of proposed fees can be verified, in most instances, using guidelines published by the engineer's professional society. These guidelines take into account the complexity and size of the proposed project.

If agreement cannot be reached with the first consulting engineer selected, that firm should be advised that negotiations have been terminated. Negotiations should then be begun with another qualified consulting engineer, and so on, until a suitable agreement has been reached.

Agreement for Engineering Services.

Once all engineering services and fees have been agreed upon, the parties may draft a formal contract embodying the terms and conditions for engineering assignments. In keeping with sound business practice, this written contract, or agreement for engineering services, should be executed by both the client and the consulting engineer.

A check list of essential provisions of an agreement for engineering services, executed in precise legal form or by exchange of letters, is as follows:

1. Effective date of agreement.
2. Names and legal descriptions of all parties to the agreement.
3. Acknowledgement of the engineer's interview with the client and visit to the project site.
4. Nature, extent, and character of the project and applicable time limitations.
5. Services to be rendered by the consulting engineer, including time schedule for execution of engineering services.
6. Services to be rendered by the client.
7. Statement that design drawings and specifications are instruments of service and remain the property of the consulting engineer, unless specifically agreed otherwise.
8. Provisions for termination of the engineer's services before final completion of his work.
9. Compensation for services rendered, including times and methods of payment on account, interim and final payment, and interest on delayed payments.
10. Additional compensation for redesign after approval of preliminary plans; for change in scope of project; for delays causing expense to the consulting engineer; or other contingencies.

Consulting Engineering Services

Types of services commonly rendered by consulting engineers include:

1. Direct personal service (technical advice, etc.)
2. Preliminary investigations, feasibility studies, and economic comparisons of alternatives.
3. Planning studies
4. Design
5. Cost estimates
6. Engineering appraisals

Engineers may consider a project in three phases: preliminary planning, engineering design, and construction monitoring. Projects are frequently terminated after the preliminary planning stage depending upon the facts developed and the nature and scope of the contract.

Preliminary Planning Phase.

In planning a new project, feedlot owners can expect the consulting engineer to perform the following functions:

1. Attend preliminary conferences with the owner and other interested parties regarding the project.
2. Collect, analyze, and interpret pertinent engineering data.
3. Write preliminary project report with sufficient detail to include alternate solutions available to the owner, preliminary layouts, cost estimates for the project, and the engineer's recommendations.
4. Provide the owner with the required number of copies of the preliminary report.

Design Phase.

Engineering services involved in producing the actual design of project equipment or facilities vary widely depending upon the nature of the project. These services may include the following:

1. Establish the scope of special investigations and tests (soil tests, appraisals, etc.) which, in the opinion of the engineer, may he required for proper design. Make arrangements with laboratories and other contractors for such analyses to be performed at the owner's expense.
2. Supply engineering data needed in application for routine permits from local, state, and federal authorities. Where special permits or hearings may be involved, prior contract provisions should encompass these details.
3. Prepare detailed specifications and drawings for construction authorized by the owner, if required.
4. Prepare detailed cost estimates of authorized construction. The engineer shall not be required to guarantee the accuracy of these estimates.
5. Provide the owner with necessary copies of approved plans, specifications, notice to bidders, and proposal forms. Extra sets of plans are to be paid for separately.

Construction Phase.

Consulting engineers can make a valuable contribution by monitoring construction while it is in progress. However, they cannot serve as the resident project representative by providing continuous project supervision.

Nor can consulting engineers relieve the contractor of his responsibility for constructing the facility according to design, protecting the on-site safety of workers and the public, and producing a complete, workable facility.

Special Services.

Consulting engineers frequently provide special services not related to actual design or construction monitoring. These special services may include:

1. Field surveys to collect information required for design.
2. Designation of a resident project representative and other field personnel as required for construction layout, surveys and on-site observations of construction. 3. Land surveys.
4. Preparation of property or casement descriptions.
5. Appearances before regulatory agencies.
6. Service as an expert witness in litigation.
7. Special investigations.
8. Soil and foundation investigations.
9. Preparation of environmental impact statements. 10. Revision of contract drawings after a definite plan has been approved.

Ownership of Documents

Original documents, plans, designs and survey notes represent the product of training, experience, and professional skill. Accordingly, they remain the property of the engineer who produced them.

The owner may, at his expense, retain reproducible copies of drawings-and other documents, provided there is a mutual agreement that the owner will use them solely in connection with the project. However, reuse of engineering documents for extensions of the original project or for new projects requires permission of the consulting engineer and entitles him to further compensation at a royalty to be agreed upon by client and engineer.

Charges

There are several generally accepted methods of paying the consulting engineer for the services he performs. The most suitable basis of compensation depends upon the nature of the particular assignment. A combination of two or more methods described herein will sometimes prove the most satisfactory.

Traditionally, engineering fees were calculated as a percentage of construction costs according to "universally" accepted schedules. More recently, however, there has been a trend toward utilizing either the reimbursable method or the lump sum basis of compensation.

Percentage of Construction Cost.

The "percentage of construction cost" method is normally used for design projects where there is a reasonable relationship between construction cost and the engineering cost of design. Basic charge curves are available from the engineer or his professional society. These curves relate the median basic charge in percent to the cost of construction using broad indices of relative project complexity. The basic charge may vary from about 6 to 12 percent. The appropriate compensation for any given assignment may be above or below the standard curves, depending upon the actual complexity of the project, logistics, and other factors.

Reimbursable Methods.

The "reimbursable method" consists of the client repaying the engineer for direct costs and services expended on behalf of the project. This method is most commonly used for assignments where the exact scope of engineering work to be performed cannot be predetermined, or where the scope of services is likely to be modified during the course of work. In addition, reimbursable methods of compensation are commonly used for design type projects. In this instance, the consulting engineer normally furnishes the client a budget, and the work is accomplished by a series of appropriations.

An alternative reimbursable method preferred by some clients is an agreed to schedule of reimbursable charges. This may list the various classifications of engineering& technical, and non-technical employees, and the hourly billing rate of each classification. Non- labor expenses are billed at invoice cost, plus a service charge for handling.

Salary Cost Times A Multiplier.

This method involves compensating the engineer at a fair "salary" rate plus overhead and other costs. A multiplier is applied to salary cost to compensate the consulting engineer for overhead, contingencies. interest on investment capital, readiness to serve, and profit.

Per Diem.

Direct personal services are often charged on a per diem basis, a method particularly well suited to court work or similar assignments involving intermittent personal services. The consulting engineer is compensated for all the time devoted to the work, including travel. In addition, he receives travel subsistence and reimbursement for out-of-pocket expenses incurred while away from his home office.

For services in court where the consulting engineer may appear as an expert witness, a per diem charge is considered to have been earned for each day of such appearance, even though the consultant may not he called to testify or, if called, may complete his testimony in a fraction of a day.

Per diem charges for consulting engineers should be commensurate with the nature of the assignment and with the experience and professional standing of he consultant. Typically, per diem charges range from $400 to $800 per day, or fraction thereof, plus expenses.

Lump Sum Charge.

This method has become widely accepted for many

types of engineering assignments in which the engineer's scope of work can be defined with reasonable accuracy. The consulting engineer ordinarily arrives at his proposed sum charge by (a) carefully reviewing the scope of services, and (b) estimating the man-hour requirements for the assignment. In some instances, the lump sum is determined by applying an appropriate percentage of the estimated construction cost of the project, an approach justified only on design-type projects of conventional characteristics.

Retainer.

The employment of consulting engineers on a retainer basis is a common practice for clients who wish to be assured of always having available the services of a certain consulting firm. This method is used in cases of protracted litigation, or for intermittent design or personal services over a period of years. The amount of the retainer varies with the character and value of the services to the client, as well as the reputation and standing of the consulting engineer in his profession. Compensation can be handled in any way that is mutually agreeable. One way might be monthly payment of a fixed retainer fee plus per diem for time spent at the request of the client.

Cost Plus Fixed Fee.

Less common, but equally effective for certain assignments, is the method whereby the consulting engineer is reimbursed for the direct cost of all his services and supplies (salary, overhead, and direct costs), plus an agreed fixed payment. This approach sometimes is employed for assignments where the consulting engineer must begin work before the cost and scope of the project can be accurately determined. The fixed payment usually ranges from 4 percent of estimated construction costs for small projects to as low as 0.75 percent on very large projects. A general statement of the scope of the work contemplated should be included in the agreement for engineering services.

The Combination Approach.

Often, the basis of compensation for a major engineering assignment involves a combination of the methods described above.

Remuneration Schedule

In the case of all major assignments, partial payments should be made to the consulting engineer at predesignated intervals based on statements which reflect the approximate percentage of work completed.

Partial payments for the preliminary design and construction phases usually are made at monthly intervals, based on statements submitted by the engineer. Charges for special services usually are billed on a monthly basis. On small projects, the engineer may prefer to bill upon completion of each phase, or on some similar basis. For design assignments, there should be provisions for changes required after approval of preliminary designs, with a clear understanding as to where final authority lies.

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