grazing leases, your neighbor's field of crop aftermath, the pile of cull potatoes down the road, and the local feed store. This is a description of your feed resources. Which of these are economical, and used in what way? The severity of your climate will also have a major impact on the final description of your economical feed resources and the level of animal production it will support.

The second consideration, your dependency on labor and machinery, will have a lasting impact on profitability. As labor and machinery costs increase, the likelihood of profit declines. You all know of the rancher that manages to calve 300 cows on his own. The point is, he designed it that way.

So to keep the animal in perspective, it is important to understand that the sun is our primary energy source. Green plants trap sunlight energy and convert it to nutrients for their growth and propagation. Animals, including humans, eat the plants and other animals, converting them into nutrients for their own growth and propagation. And thus, energy flows from the sun. A world of animals depends on the energy captured by a world of plants, **and life on this planet is a function of this energy flow.**

SUMMARY OF CHAPTER FOUR:

* Animals are a tool to convert forage energy to a marketable product.

* Prosperity in ranching is dependent on your ability to create a positive energy flow.

* The genetic fit of an animal to the environment is when the animal's nutritional demand matches the feed available.

is less than

CHAPTER FIVE

NUTRITION - THE SAIL ON YOUR BOAT

You are really feeding the rumen micro-organisms when you feed the ruminant animal. These micro-organisms digest the food supply you provide them, reproduce rapidly and then some die. The population of micro-organisms will literally grow and die off in waves following each feeding. The bugs that die are passed from the rumen into the small intestine where they are digested by the animal. This is how the ruminant animal gets protein, from digesting the bodies of rumen micro-organisms.

There are two main sources of dietary energy. One source is carbohydrates, such as starch and sugar. Seeds of plants, grains and potatoes for example, are rich in carbohydrates. The vegetative parts of plants, the stems and leaves, also contain some carbohydrates. All animals have the ability to digest carbohydrates as a source of dietary energy. The other source of dietary energy is fiber, such as cellulose and hemicellulose, which gives the plant its structure. Fiber can only be digested by bacteria, protozoa and fungi, the micro-organisms found in the rumen. The micro-organisms produce compounds called volatile fatty acids as they digest fiber. These volatile fatty acids are a source of energy for the animal.

The ability of the rumen microbes to digest fiber and thus provide energy and protein for the animal depends on two things:

1) maturity of the plant material (as plants mature, undigestible lignin binds with all the nutrients and nutrient value is greatly reduced).
2) the type, size and health of the rumen microbial population.

Fiber digestion in the rumen is relatively slow. With this type of digestion, rumen pH is around 6.2 or higher, favoring the type of micro-organisms which are most effective at digesting fiber. These are called cellulolytic micro-organisms. If a ruminant is fed starch, the digestive process is more rapid, resulting in a lower pH around 5.4. This more acidic pH favors a different population of micro-organisms, those which are more effective at digesting starch and less effective at digesting fiber. How you feed and supplement your cows or ewes can influence their relative ability to digest and use the forage available. Likewise, how you manage the forage, whether grazed or mechanically harvested, will influence the digestibility.

Now, you can understand and appreciate the value of ruminant animals for their ability to digest both the carbohydrates and fiber component of forage. Managing the nutrition of a grazing animal boils down to managing forage digestion. It is your job, through nutritional management, to maintain a large, healthy population of fiber digesting microbes in the rumen. Then, with an ample supply of plant material, the grazing animal will do its job remarkably well.

GRAZE-SUPPLEMENT-SUBSTITUTE

Your objective is to maximize effective use of grazable forage. Grazing standing forage is the least costly manner of providing the base diet for ruminant animals because the forage on your ranch is your primary product. When the base diet does not meet the animal's nutrient requirements, supplementation is required. Supplementation is adding a small amount of a feed which will not reduce the animal's consumption of the base diet, but will balance the nutrients provided in the base diet with the nutrients required. Feeding is appropriate when standing forage is no longer capable of providing the quantity required for the base diet. At this point, you replace grazable forage with harvested or conserved feed as the total base diet, such as winter hay. Feeding is the most costly manner of providing the base diet. Substitution is the unintended and costly situation when your supplemental feeding results in a partial replacement of standing forage as the base diet. This can happen in three ways: 1) a pound for pound replacement of the base diet when you supplement with another forage; 2) you can reduce the rumen's ability to digest the forage diet if you supplement with too much concentrate; 3) you can change animal grazing behavior when they start waiting around for the handout.

Remember, your total potential wealth is generated at the primary level, forage. Everything you do in ranching is designed to package and market that primary product. A pound of beef or lamb produced by feeding conserved hay must pay a share for the energy input of conserving the hay. This includes costs of fuel, labor and equipment for both putting it up and feeding it out!! The following feeding strategies are suggested with this in mind.

FEED THE RUMEN MICROBES FIRST

The first consideration in knowing how and what to feed, then, is knowing what to feed the rumen microbes. This is dependent on the quality and quantity of forage the animal harvests and makes available to the microbes.

When both quality and quantity of forage in the diet are high, mineral supplementation is often all that is necessary. As the quality decreases (decreased crude protein), the population of rumen micro-organisms decreases, their ability to digest forage decreases, and the animal becomes both protein and energy deficient.

A forage diet with less than 7% crude protein does not provide enough protein to keep a large, healthy population of rumen micro-organisms. This situation requires protein supplementation. Even with forage diets up to 10% to 12% crude protein, natural protein supplements have been shown to increase animal performance. By properly supplementing the micro-organisms with protein, the rumen's ability to digest fiber will be enhanced, resulting in a faster rate of digestion, increased forage intake, and more energy created by the process of microbial digestion.

This is well demonstrated by the research data in Table 1. In this trial, cows being wintered on low quality native range were fed either 2.8 lbs of a 15% crude protein supplement or 2.8 lbs of 40% crude protein supplement. Those receiving the higher protein supplement were better able to digest the forage they ate, and in turn, ate more forage. The net result was a 49% increase in digestible dry matter intake, and the cows lost significantly less weight through the winter than the cows receiving the lower protein supplement.

TABLE 1
WINTERING COWS ON NATIVE RANGE*

	Crude Protein in supplement	
	15%	**40%**
Supplement, lb/day	2.8	2.8
Weight change, lb	-196.0	-79.0
Forage digestibility, percent	37.2	41.9
Forage intake, lb/day	16.2	21.4
Intake of digestible dry matter, percent	100.0	149.0

* AGRI-PRACTICE, Vol. 10, No. 5, Sept/Oct, '89
Article by Don Wagner, Ph.D.

Table 2 shows data from another trial which further demonstrates a direct increase in winter weight gain in heifers as the supplemental protein was increased. This was true for both a native range diet and a grass hay diet of low quality.

We could plant as sorg?

TABLE 2
WEIGHT RESPONSES OF HEIFERS TO PROTEIN SUPPLEMENTATION*

On grass hay	Winter wt change, lb
1 lb 20% CP	-11
1 lb 30% CP	+34
1 lb 40% CP	+81
On native range	
1 lb of 20%	-26
1 lb of 40%	+15
2 lb of 20%	+15
2 lb of 40%	+38

* AGRI-PRACTICE, Vol. 10, No. 5, Sept/Oct, '89
Article by Don Wagner, Ph.D.

From this information you should understand the following principle. When the base forage diet is low quality (less than 7% CP) or moderate quality (8-12% CP), supplemental protein will enhance the ruminant's ability to digest forage, resulting in increased intake and improved performance. A word of caution: we are not after maximum animal performance, but rather the most profitable use of the forage. Supplementation to achieve maximum animal performance is not always most profitable.

Table 3 illustrates the ineffectiveness of feeding concentrates as an energy supplement without first meeting the protein requirement of the animal on a forage diet. In this study where the heifers' base diet was 4.2% CP prairie hay, protein supplementation boosted hay intake and animal performance, while corn alone had only a minor effect.

TABLE 3
EFFECT OF SUPPLEMENTATION ON PERFORMANCE OF WEANER HEIFER CALVES FED PRAIRIE HAY CONTAINING 4.2% CRUDE PROTEIN*

	Daily Supplement		
	None	1.25 lb. CSM	1.25 lb. Corn
No. heifers	10	10	10
Avg. gain, lb.	-115	35	-92
Avg. hay intake, lb/day	8.9	11.9	8.9

* Misc. Publ. 67:92 (1963), from an article by Lusby and Armbruster

When is the appropriate time to feed an energy supplement? Hardly ever! However, in special circumstances like extreme cold or flushing ewes prior to breeding, it is appropriate. Generally, protein supplementation is a more effective strategy when an adequate supply of the forage base diet is available.

When there is not an adequate forage supply available, feeding is required. Two classic examples are the feeding of hay during winter months, and feeding high grain diets during drought. Any situation in which standing forage is replaced by conserved energy is costly.

Always remember the ruminant is specially designed to make good nutritional use of forage. Try not to interfere with this process. Rather, do no more than is necessary to enhance this process when appropriate. For optimum energy flow, and quite often cash flow, it makes sense to evaluate the forage resource you have first, then match animal demand with the forage resource available.

OTHER SUPPLEMENTATION CONSIDERATIONS

Protein for The Animal's Sake
The other situation when protein supplementation should be considered is when a heavy milking cow at peak lactation is eating a diet with less than 12% CP. Her protein requirement is more than can be provided by the micro-organisms. To support her performance capability, she needs additional protein supplementation. If this supplementation is expensive, you must consider the economic balance of animal performance and feed cost.

Minerals and Vitamins
These nutrients are very important to the proper functioning of the digestive process, and all other body functions. The question of what and how to supplement minerals and vitamins can be very complex and very confusing. Perhaps a simple strategy to help clarify and guide such choices is appropriate. First, provide a balanced mineral supplement at all times. Next, be aware of the particular deficiencies in your specific geographic area and provide for those minerals in the supplement.

Avoid a Microbial Population Shift
When a ruminant, eating a forage base diet, is fed a high level of concentrate, such as corn, the microbial population will shift from fiber digesters to starch digesters. When this happens, the rumen is much less effective at digesting the forage diet. The animal will eat less and suffers rather than benefits from the supplementation. This can be avoided if the supplement is fed at a daily rate of not more than .4% of a cow's body weight (4 lbs for a 1000 lb cow,) or .2% of ewe's body weight (.25 lbs for a 150 lb. ewe).

Feed the Appropriate Protein Type

The more simple forms of protein, such as a single nitrogen atom or a single amino acid compound, are rapidly digested by rumen micro-organisms. These forms of protein can be referred to as rumen degradable protein, because the microbes will digest them in the rumen. More complex proteins take much longer for microbes to digest and pass through the rumen undigested. These are referred as by-pass protein, as they by-pass the rumen without being digested. Some by-pass protein is excreted; some is digested in the small intestine.

Most common feeds have a combination of the simple forms of protein and the complex forms and, therefore, provide both rumen degradable and by-pass protein. Table 4 lists some feeds and shows the percentage of protein they provide which by-passes the rumen without being digested.

Here is the practical application of this knowledge. When feeding a low quality forage diet (less than 7% CP), the micro-organisms are starving for protein and need a form of supplemental protein they can digest. In this case, do not feed a high by-pass protein feed such as blood meal. Conversely, if the forage diet is above 7% CP but you choose to supplement to meet the high protein requirements of a heavy milking cow during peak lactation, feed protein that will be digested in the small intestine. In this case, do not feed a very low by-pass protein feed such as urea.

TABLE 4

BY-PASS CLASSES OF PROTEIN*

	% by-pass
Very low by-pass:	0-20
Urea	
Casein	
Low by-pass:	20-40
Soybean meal	
Peanut meal	
Medium by-pass:	40-60
Cottonseed meal	
Dehydrated alfalfa	
Linseed meal	
Corn grain	
Brewers dried grains	
High by-pass:	60 or above
Meat meal	
Corn gluten meal	
Blood meal	
Feather meal	
Distillers dried grains	

* CSU CES Service In Action

SUMMARY OF CHAPTER FIVE

* Ruminant animals are valuable because they can digest fiber

* You are really feeding the micro-organisms in the rumen when you feed a cow or ewe

* Managing the nutrition of a grazing animal is managing forage digestion

* Protein supplementation is the key to increasing both protein and energy available to a ruminant animal eating a low quality forage diet

CHAPTER SIX

ECOLOGY

Survival in the ranching business may be possible for an unknown amount of time with limited knowledge of how to manage our ecosystem and natural resources. To go beyond survival your ranch business must be feasible and profitable. The transition to profitability is only possible by increasing our knowledge about how to manage your natural resources and ecosystem of which we are an indistinguishable part.

We know that the management of our ecosystem is important because we have taken it apart and examined it scientifically every way possible. Knowledge gained by their research has failed in stopping natural resource deterioration. In some cases we have managed to stem the deterioration but permanently reversing it has not been successful. There is a growing feeling of urgency to solve this problem. Major problems are building between production, recreation, and those people who feel at all natural resources should not be used but conserved. There is obviously a need to go the next step beyond "integration," that of holism.

Alan Savory has been a leader in the advancement of this philosophy of holism for many years. The following is a reprint of The Savory Letter, January 1985, Number 7. Permission to reprint has been granted to CRMS by the Holistic Resource Center, Albequerque, New Mexico.

SAVORY COMMENT ON HOLISM

In this and the next three Letters I would like to devote my column to the **four missing keys**--the knowledge we were lacking in the management of our ecosystem and its resources that prevented us from achieving success no matter how much effort we poured in.

With Ethiopia's starving people hitting the headlines as well as the fact that almost all ranchers in the United States are in ever increasing trouble for the same reason basically--land deterioration--this is timely. Some of you will also have seen the excellent program on American agriculture that appeared on the television series "Nova" in which the point was made over and over again that American agriculture is unsustainable. The technology involved, in which all of us have such faith, is creating as many problems as it is solving.

Many share the view of Dr. Mostafa K. Tolba of the United Nations Environmental Program who, when writing of the 850 million people currently being adversely affected by the world's desertification, stated that given $92 billion to spend on it the year 2000 would see the end of desertification.

I do not share that view as there is just too much evidence to the contrary. Let me take just one example to make this point. I'll use the state of Texas, but bear in mind I could have chosen a number of other states or countries. Texas is but one state in America where the environment is not as brittle as it is in the many African countries suffering from desertification. Texas is wealthy. Texas has enormous universities and an immense infrastructure of extension people. Texas has wealthy ranchers, many of whom are highly educated and many who genuinely care for their land. Texas has no impediments whatsoever to ending its own desertification problem. Obviously then all the billions of dollars that have been applied in Texas should have stopped the problem.

On the contrary, the results have been very disappointing. Texas land continues to deteriorate and ranchers without oil wells are in dire financial straights. In fact there is no evidence to suggest that desertification has been halted. If the same technology and the dollars to finance it continue to be exported to the third world countries as we are doing at present how will it help them? Their desertification will no more be stopped by it than has that of Texas and they will still have to repay the debt plus interest. Perhaps now you see that the assumption that we have the answers in our present technology and all we have to do is pour in enough money, is erroneous. We urgently need to relook at the whole situation with open minds.

As I have explained many times, our current technology is failing us for the simple reason that there were four keys missing in our knowledge concerning land deterioration. They are:

1) The different nature of brittle and non-brittle environments.
2) The role of the herding animals in brittle environment stability and productivity.
3) The role of "time" in animal, soil, and plant relationships in brittle environments.
4) The need for science to advance to the next step beyond "integration," that of holism.

It is to this last that I would like to devote the remainder of this column.

If any of us could start with clear minds, the concept of holism would no doubt be an easy one to understand. But we all have previous conceptions that must be displaced before new ones can be accepted, and holism for many people will require a lot of displacement. I am one of those people. Because of my previous

training as a scientist I have taken a long time to grasp it. And even now, I am only just beginning.

There are a great many people using the word these days and I believe that nearly all of them have no idea what it really means. I have worked with it and used the word for over 20 years and yet at the schools some of you have heard me state that it is only within the last year or so that I have finally begun to understand it. I am embarrassed to admit that I have a number of copies of old papers and talks I have given that are stark reminders of my ignorance.

WHAT IS HOLISM?

The philosophy of holism was introduced by General Jan Smuts (1870-1950), a South African statesman, soldier, lawyer, botanist and scholar. Holism, said Smuts rests on the belief that in natural systems only the whole is an entity and the whole is greater than the sum of the parts. According to the **Encyclopedia of Philosophy** (Macmilland & Free Press), "Smuts apparently wished to distinguish wholes in the strict sense from mere aggregates, mechanical systems, and chemical compounds. In a true whole the parts lose forever their prior identity. In aggregates, mechanical systems and chemical compounds, however, the identity of the parts or elements is not lost buy is always recoverable." In other words, the parts in wholes are not reality, only the whole is reality.

Smuts also believed that true wholes, "free of any admixture of mechanism," were exemplified in minds or psychic structures, which first appeared amongst higher organisms, and in the human personality which he believed was the "supreme embodiment of holism." Many people have been working on this "human side" of holism for a number of years in the fields of holistic health and interpersonal relationships. We share some of their work in the Management Workshops that we sponsor. In fact, since our tie up with Don Green and the associates working with him, I believe the Center is the first body actually working on putting the human and the ecosystem back together as they rightfully should be. Up till now we have tended even in our most advanced thinking to see the human as one entity and the ecosystem as another although we appreciated that the human was dependent on the ecosystem. Now we are appreciating that the human **is** the ecosystem, i.e., the human and the ecosystem **are one entity.** This is not an easy thing for us to grasp. Imagine humans without the ecosystem. Of course humans would not exist. Imagine the ecosystem without humans. It would still exist, but not as it was. It would continue in a reduced form until something evolved to fill the niche left by humans. Primitive man and the herding ungulates were the ecosystem in brittle environments and removal of these by modern man has produced profound change as witnessed by the world's desertification. Learning to understand that and with that understanding trying to rebuild the ecosystem by simulating

the roles of primitive man and the wild herding ungulates, is a big part of the HRM process.

Like all concepts, someone has to make the start in propounding such theories and then eventually as acceptance is gained and knowledge grow and gathers further acceptance, so the process accelerates. I am of the opinion that now that mankind is at last looking at holism seriously, our knowledge of it will begin to expand rapidly.

Two recent events have given me a better understanding of holism, and if I share them they might help you. In the first instance I had been working with a large family-owned ranching operation for some years involving land, livestock, wildlife, timber, farming, staff, finances, and so on. And the results were basically disappointing. I took the blame myself for our lack of success and persisted in trying to get at the root of the problem. I would like to say that I was able to actually find the "weak link," but in the end help came from outside. A couple of the family members attended one of our Management workshops and with the help of Don Green located the "weak link." It is a complicated one and we are working on it right at the moment so I am not going to go into any detail other than to state that it lay not on the ranch but within the people and was fundamentally due to an illness which in turn had deep causes. Already, real progress is at last being made. It has been a wonderful experience for all involved in learning how all-inclusive holism is and how superficial our conventional way of looking at such situations is. Many years of hard work on gross margin analyses, stock flow plans, various grazing plans, ranch plans, new and better management plans for the employees, livestock, wildlife and timber, were to no avail because we were still not seeing the whole picture. Until we put the people part of it right we could put none of it right. This has helped me to more fully comprehend holism than any other consulting experience in my life.

Another experience which greatly contributed to my understanding of holism was in a conversation I had with an environmentalist. I was pointing out the dangers of fencing-in river systems to prevent their deterioration when she sharply disagreed with me. She told me of a successful case where both a river system and a lake had been fenced in to halt the serious damage being done by cattle. The vegetation had increased enormously she said. However, some of the trout in the lake had thereafter died out. As so often happens in stimulating conversation, thoughts that have been lurking in the back of your mind suddenly crystalize and you at last find the words to express them. I was able to tell the environmentalist that she was seeing the lake and the river as separate entities divorced from their catchments. She saw them, in fact, as isolated ecosystems.

All that really existed in that situation was the whole ecosystem in which there was an area of low-lying water accumulation that was seen as a river leading into a lake. The ph of that water, the silt load, the temperature, the energy available and so on, were all dependent on the whole and could be affected by what was happening hundreds of miles away. Fencing it in as though it were an isolated ecosystem was meaningless and dangerous in the long run as it then closed our eyes and minds to the greater issues affecting it. Again this conversation helped me to better comprehend where we are at as humans in our understanding.

Those of you who have heard me speaking about HRM at recent talks have seen me use little clay blocks to try to illustrate holism more clearly than words can do. It appears to help. Unfortunately I cannot do that in his column so I am going to try to use the "hologram" on page 36. (Don't worry about that fancy word--it just refers to a picture taken with laser beams.)

First take a close look at the picture and try to envisage it as an ecosystem that we have to manage well. This is the sort of confusing picture mankind saw when first trying to understand ourselves and our environment. The logical thing to do is what we did in developing science--try to break it up into parts for separate study. Surely if we can learn enough about each of those squares we will understand and thus be able to manage the whole. Western civilization has in fact been doing just that for the past few centuries. There is no doubt that this was an essential step in mankind's scientific advancement and we have been able to do marvelous things with it. We have put people on the moon, we can communicate across the world and into space over various wavelengths, we can transplant hearts, and even blow each other up.

However in the management of the whole that we set out to manage, we are visibly failing. Our water supplies, and wildlife are dwindling, forests and lakes dying, people starving on deteriorating land, ranchers going bust on once highly productive land and so on.

Because many could see and accept that we were failing, they sought solutions in a "multi-disciplinary" or "integrated" approach. We had trained our scientists to be specialist, or "blinkered horses," so that they could see straight ahead and not be confused by too much complexity. When we took a step forward with the integrated approach we were in fact putting together whole teams of blinkered horses. Unfortunately very few of us, whether we were consultants, teachers or government advisors, could see that a team of blinkered horses was capable of blundering even more than our solitary blinkered horse. Needless to say, the team of blinkered horses was no match at all for one unblinkered horse.

Where many are now able to see that our old single-blinkered-horse approach was not solving our problems, few at this stage are seeing that the team-of-blinkered-horses approach is also failing and at times very badly. In ignorance, many are convinced that this "integrated" approach is in fact a holistic approach. The two are not synonymous. In fact they are almost opposed. Let me try to get this across with an analogy. Let me assume for a moment that I have a "whole" which is a liquid sugar solution. Let me assume in studying this that we have managed to convert it to the solid form of sugar grains. After some time of studying one of the sugar grains we find we are not understanding the liquid and so we now put many sugar grains together. Now we find we can pour it from one glass to another and yet still it is not behaving like the liquid was. Not till we have added water and gone back to the liquid form will it behave as a liquid. But now, much to our frustration, the identifiable grains we had, have all lost their form and disappeared. No matter how many grains we put together it was still in the granular form (or no matter how many disciplines we integrate it is still the discipline form) and we will only ever understand the liquid by studying the liquid form.

Now think in terms of a whole ecosystem. For years we have tried to work on it as parts (disciplines or professions if you like) that we though were truly representative parts. We did not know that in the whole there are no parts and that if we pull out what we perceive as parts they will be different than they were when whole. (In other words, as Smuts would say, we haven't realized that the total is greater than the sum of the parts. Nor, he would say, have we distinguished wholes in the strict sense from mere aggregates--"In a true whole the parts lose forever their prior identity").

In brief, the integrated approach, while a step forward in mankind's progress, is really just the old single discipline approach. The parts (individual disciplines or specialties) have been put together in a necessary step forward but they are not relating to each other properly because they are not holistic in concept. This is a frustrating experience for all concerned because it is obvious that if we put together an integrated team of range people, economists, animal scientists, management specialist, engineers and so on, we must surely succeed in managing ranches and watersheds and other parts of our ecosystem. It is as obvious to us now as it once was obvious to all that the world was flat! When a thing is that obvious unfortunately it takes a long time before we believe evidence to the contrary.

Others besides those of us involved in the Center have seen the pending failure of the integrated approach. A good example of this is to be found in the reference to the work of Domer in **Landscape Ecology**, by Naveh & Leiberman.

The authors refer to holism and state that it has ceased to be a matter of academic or theoretical interest but has become a matter of extreme practical urgency because of the world wide problems associated with the deterioration of our ecosystems. They then give a warning on the "integrated approach" with a reference to Dorner:

> "In a computerized simulation game, Dorner asked 12 professionals from different relevant disciplines to propose an integrated development plan for the overall improvement of an imaginary African country called Tana. The results achieved were very disappointing: if these proposals were carried out they would worsen the lot of the people, destroy the agricultural-economic base, and create new, even more severe problems."

The only thing that I can fault in this is the use of an "imaginary country"--why imagine one? Why not just use the current integrated management being applied in any one of the brittle states of America today--or the World Bank or U.N. assistance to any third world country. Whenever we put together teams of specialist from all the relevant disciplines we can bring to bear on the problem, we are going to have to anticipate poor results.

Gradually we are going to have to learn how to relate each of the present day disciplines holistically. The range profession has already been very influenced by the new concepts involved in HRM, including holism, but what of the other disciplines? Perhaps some of our commonly accepted economic notions will be the next to start feeling pressure for change but I am not going to get too far into that now--mainly because I do not yet know how to--although we are starting to work on much that we sense is clearly wrong. A rancher, for instance, might say to himself, "How can it be wrong to bring an economist into the team and to work with him. Surely that is better than my present approach without one where I try to sort out my problems on my own?" You can't fault the logic in that thinking, but it is my belief that the rancher had better make sure that the economist also has a good understanding of the Holistic Resource Management process or he will probably endanger the rancher further.

This does not mean that all our current economic theories are wrong, it just means that they are too narrow and thus impractical for a world that must be viewed holistically. Let me cite a case to illustrate my point. At the International Ranchers Roundup in Texas a couple of years ago I sat in on a very good presentation of a paper on the economics of brush clearing by a concerned agricultural economist. In this he proved beyond doubt that a particular treatment for the particular problem brush was economically sound and cost effective and the best of the alternatives. Unfortunately if

Same problem everyone else faces
Ranchers not alone
Responsibility yours

applied to a ranch it would, even if successful, have tended to break the rancher financially because the economist was not looking at the situation holistically. The use of this particular treatment could not have passed any of the "guideline tests" applied through the HRM model; it would have pushed up the overheads (or the "red line" as we call it), and it would have squandered human and financial resources. The person presenting the paper was not to know that, nor were the ranchers in the audience.

This economist was using currently sound economic analysis techniques but they were not developed with an understanding that wealth has to be created from energy.

The economist was doing the correct economically but the wrong thing holistically and thus you can see where one discipline is adding to the problems of the ranchers. Now assume that we have 11 other relevant disciplines doing what is correct from the standpoint of their particular discipline, but what is wrong holistically, and you begin to see why Dorothy's imaginary country was in danger of collapse had it followed the advice from the 12 experts who integrated their efforts. If each discipline is not relating to the whole correctly then integrating many of them will not suddenly make the whole sound.

What is true biologically as well as economically

How much simpler it would be if we could all just go back to the old days when in blissful ignorance we were ranching and farming on "biological" capital that appeared to be endless. On the other hand, what an exciting era we are embarking on.

So far I have described the stages we are passing through in mankind's advance towards holism using the picture made up of all of these different blocks. But is there a different way of viewing this picture that might help us better understand and thus manage it? Look again at the picture. As we have see, we did not succeed in understanding it by studying the blocks that make it up. No matter how much money or effort we were to spend on researching the individual blocks and their relationship to each other it still does not help us, or the whole is something greater than the parts. In fact, when we see this picture as a whole, we discover that it is a picture of a face. In fact it is a familiar face to many of us. If you have not seen this yet, look at it from as far away as you can--almost the further you can get from it the clearer it will become.

Now you are seeing the whole! If this was what you had set out to manage would it not have been preferable to have seen the whole first and known what it was that you were dealing with? Of course it would. Now, knowing what we are dealing with, we would approach it in a completely different manner than by trying to break it up into meaningless blocks. In this case we would handle this person as a human and an intelligent one. No amount

of knowledge of those blocks would ever have put us in this position.

I am not saying that the detail is not important. The detail is very important and the more that we have the better, as long as it is not at the expense of the whole. As we are the ecosystem modern man's economic, social, and political structures and so on cannot be separated if we are to manage our "ecosystemselves." I find as we begin to grope into the next scientific generation we are at times short of words. I am not an erudite person--I failed English at school and Latin as well--and I can feel some of what I have tried to convey far deeper at present than I can yet express in words. As there are so many of us becoming involved in this field now perhaps someone else will express it better. I hope I have helped you a little to think holistically, at least as it is imperative that we learn to think holistically.

I say imperative because I see how many of mankind's current ills are due to our inability to view the world and its problems holistically. At the moment neither I nor anyone else has the answers but I do know that seeing the problem is the first step in solving it. And I firmly believe that what we are doing in this Center, together with others working in the forefront of human holism and alternative agriculture, is the leading edge to a better future for us all. With this in mind it is particularly pleasing that so many are beginning to see this Center as a service organization to other individuals and institutions grappling with these problems. It is only through this collaborative approach to something bigger than any of us that we are going to succeed. And succeed we will.

Allan Savory