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Problems With Kosher Slaughter

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Abstract

Ritual slaughter to produce kosher meat is rooted in the teachings and writings of the Talmud. However, the preslaughter handling features of modern systems, particularly the shackling and hoisting of large steers, contravene the basic message of humaneness included in the teachings. The throat-cutting of a live, conscious animal is relatively pain-free, provided that certain precautions are followed, but U.S. kosher plants need to install newly developed conveyor-restrainer systems to eliminate the abuses of shackling and hoisting. Conveyor-restrainer systems for large and small animals are discussed.

The Religious Ritual

In order for a piece of meat to be kosher, it must be slaughtered and processed according to ritual methods specified in the Talmud. These methods derive from explicit commands contained in the Torah on the types of animals that the children of Israel may eat and how these animals should be prepared for consumption. 'Shechitah', the act of killing for food, must be conducted by a learned, pious Jew, the 'shochet', who is trained in the slaughter ritual.

The shochet slaughters the fully conscious animal with a razor-sharp knife, which must be twice the width of the throat of the animal to be slaughtered. He uses a single, smooth deliberate motion, severing the carotids and the trachea. After each cut, the shochet checks the knife for nicks or imperfections. If the blade has a nick, then the animal is declared to be 'tref' or not kosher and the meat is sold on the regular market. Shochet Rabbi Garb (1977, personal communication) contends that, if the cut is made correctly and the knife has no nicks, the animal feels little or no pain.

The five rules of kosher slaughter are as follows:

1. 'Shechiyah' (Delay)—A delay or hesitation of even a moment makes the

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animal's flesh unkosher. The knife must move in a single uninterrupted sweep.

2. 'Derasah' (Pressing)—The knife must be drawn across the throat with little exertion. Any undue pressure renders the animal unkosher.
3. 'Haladah' (Digging)—The knife must be drawn over the throat so that it is visible while shechitah is being performed.
4. 'Hagramah' (Slipping)—The limits within which the knife may be inserted are from the large ring in the windpipe to the top of the upper lobe of the lung when it is inflated, and corresponding to the length of the pharynx. Slaughtering above or below these limits renders the meat unkosher.
5. 'Ikkur' (Tearing)—If either the esophagus or the trachea is torn out or removed from its normal position during slaughter the carcass is unkosher.

The shochet's work is not done until he has inspected the internal organs for signs of disease. The Talmud contains detailed instructions on how to conduct a postmortem inspection. If any sign of disease is found the entire carcass is declared unkosher. The ancient Jews had considerable knowledge of anatomy and their postmortem inspection was the forerunner of the USDA inspection which takes place in all federally inspected meat packing plants. In a kosher plant, the carcass and internal organs are inspected by a shochet and either a state or USDA meat inspector. While the USDA rejects only the part or organ which is unwholesome or diseased, the shochet rejects the entire carcass. The shochet may, however, pass carcasses from a sick animal since there are many pathologies which are not specified in the Talmud.

After the carcasses have been inspected, the rabbi or shochet puts a kosher mark on the brisket of the carcass, and on the edible offal such as tongue. In a large kosher slaughter plant, 2 or 4 shochets will work together, slaughtering, inspecting organs and tagging meat. Rabbi Abe Krieser (1977, personal communication) explained that a different mark, corresponding to one of the 52 chapters in the five Books of Moses, is used each week.

If the carcass is held in the cooler or during transit for more than 72 hours after slaughter it must be washed; otherwise it will lose its kosher status (Wentworth, 1953). One of the major reasons for washing the meat is to remove blood. When the meat is consumed in the home, further steps are taken to remove blood., The meat must be soaked in cold water for half an hour and then salted before cooking (Gordon and Geller, 1955). Another acceptable way of preparing meat is by broiling since the blood drips away through the rack.

Torah states that the blood contains the life, or soul, of the animal. The prohibition against eating blood is stated many times in the Bible. "Only be sure that thou eat not the blood: for the blood is life, and thou mayest not eat the life with the flesh" (Deuteronomy 13:23). The penalties for eating blood were severe: "If any Israelite or alien settled in Israel eats any blood I will set myself against the eater and cut him off from his people, because the life of the creature is in the blood" (Leviticus 17:10-11). The animal must therefore be presented fully conscious for slaughter not only because stunning constitutes a blemish and renders the meat tref, but also because it was and is believed that slaughter of a conscious animal maximizes bleedout. However, Cockrill (1974) maintains that "there is more blood remaining in the flesh of animals killed ritually than when they are first made unconscious before bleeding. The lighter color of ritually

slaughtered meat is due to the larger amount of oxygen in the blood as a result of heavier breathing of the animal before it dies." In many instances, a stunned animal will bleed out as well as or better than one slaughtered without stunning (Grandin, 1980a).

Observations by the author in slaughter plants indicate that heavy steers killed by the kosher method have more bloodsplashed meat (small hemorrhages in the meat) than heavy steers which are stunned with a captive bolt. During the fall season, when animals are more prone to bloodsplashing, the incidence of bloodsplashed meat in ritually killed heavy steers may reach 2-10%. Bloodsplashing seldom occurs in ritually killed sheep.

The Importance of Kashrut (Dietary Laws)

Many people wonder why Orthodox Jews believe in maintaining dietary laws which from the practical standpoint of hygiene are no longer needed. According to Rabbi David Rebibo (1977, personal communication), Dean of the Phoenix Hebrew Academy, observing the dietary laws helps one to live a holy life. In Biblical references to dietary laws, the concept of holiness is integral. Deuteronomy 14:21 says, "Thou shalt not eat an animal that dieth itself, for a holy people are ye to the Lord." The Handbook of Jewish Dietary Laws, which is published by the Union of Orthodox Jewish Congregations of America and the Rabbinical Council of America (Gordon and Geller, 1955) concludes: "Thus the Bible uniformly regards the Dietary Laws as a discipline of holiness. They are a discipline of the spirit imposed on a process that is otherwise entirely physical. They are an insistence that man's eating should be not only a satisfaction of his bodily appetites, but also an exercise in holiness of the soul. Judaism takes eating and drinking and weaves them into the fabric of religious living."

Grünwald (1955) stated that the person performing shechitah should think about the act of taking an animal's life:

> *"A man may kill an animal but he should always remember that the animal is a living creature and that taking life from the animal involves responsibility." (Levinger, 1979a)*

Judaism attaches great seriousness to the act of taking life. One reason for the many laws detailing the precise manner by which animals are killed for food is to maintain controls on the act itself.

About six years ago, I started designing slaughter equipment and was disturbed by cases of brutality and desensitization. As I continued to work on the equipment used to end the lives of the cattle I became convinced that slaughter should be treated as a sacred ritual as demonstrated by this passage, written four years ago,

> *"I reached over the side of the chute and touched a steer's back. I had empathy for the animal and maybe it sensed it because its fear diminished. In a few seconds the animal would become beef, and the essence of its individuality would return to God. For any living thing to continue to live another living*

thing has to die. I felt a closeness and a respect for the steer I had never felt before."

"To become more aware and understand, not just in my intellect but in my heart, I realized that I would actually have to kill the animal. To refuse to participate in the killing part of the process would be a denial of reality. I was afraid to step over to the stunner's platform and kill the animal. There has been great progress made in the equipment used to kill food animals. It is easy to operate and painless for the animal."

"People have a conscience which enables them to be aware of the consequences and meaning of their acts. The ending of the life of a living thing should be approached with respect. This would help me become more aware of the meaning of my own existence. To become aware I had to be able to kill the animals, but at the same time maintain an attitude of gentleness and respect for them. Killing is a harsh act, but harshness is part of nature; gentleness is also part of nature. If you lose respect for the animals the killing process degenerates into assembly line box stapling, or you turn into a brute. On the other hand many people run away from the fact that the animals have to die.

"A person who is able to respect the animals and plants which we harvest for food will be able to take the first step of learning the meaning of life. A farmer is said to be close to the earth. Many people in our modern technological society have lost touch with the earth. Their values have become trivial." (Grandin, 1976, unpublished).

The builders of high speed automated slaughtering equipment in Holland appear to have similar feelings. The Machinefabriek, G.J. NIJHUIS B.V., in Winterswijk, Holland named their most highly automated equipment "Walhalla". In Nordic mythology, Walhalla is the paradise for warriors who died gloriously in battle. (Davidson, 1972).

Humaneness of Kosher Slaughter

Preventing pain to an animal is a command of the Torah (Cohen, 1949) and great care is taken to insure that the throat cut will be as painless as possible. Morris Laub (1966) of the United Synagogue of America states: "Jews have been known for their active interest in humaneness of (sic) animals. Indeed, the very reason for shechitah items from our concern for humaneness towards animals. Our religious literature is replete with injuctions against *tsaar baal hagim* — inflicting pain upon animals." An animal is declared unkosher if the knife is nicked because a rough spot on the blade can cause pain. Levinger (1979a) cites many passages from the Talmud concerning the importance of humane treatment of animals. For example, "the righteous man knows the soul of his animal" and "he does not overfeed or overwork his animal" (Epstein, 1948). Albert Einstein (1938) emphasized the importance of humaneness in general. "To

be a Jew, after all, means first of all, to acknowledge and follow in practice those fundamentals of humaneness laid down in the Bible—fundamental without which no sound and happy community of men can exist."

Throat-Cutting Without Stunning

There has been a great deal of controversy over whether or not it is painful to cut the throat of a conscious animal as is done in kosher and Moslem slaughter, and in the slaughter of lambs in New Zealand and Australia. While the shackling and hoisting of a conscious animal is totally unacceptable, the use of a restrainer does not resolve the question of throat-cutting.

Nangeroni and Kennett (1963) conducted a careful study with the EEG to determine how long different animals remain conscious after they have had their throats cut by the kosher method (Table 1). Later studies, also using EEG techniques, confirmed that sheep are permanently insensible 3 to 10 seconds after their throats are cut (Blackmore *et al*, 1979). Baldwin (1971) demonstrated that it took 8-10 seconds for goats to become unconscious after the carotid arteries were tied off. It is possible that tying the carotid arteries could prolong the time to the onset of unconsiousness because the blood pressure would not necessarily drop. Small, one-week old calves may remain conscious (as determined by the EEG) for up to 100 seconds after having their throats cut kosher style. "In contrast to sheep, the vertebral artery in the calf directly contributes to all parts of the brain" and this delays cerebral anoxia (Blackmore *et al*, 1979). In addition, calves may remain conscious for longer than mature cattle due to their greater tolerance for anoxia (Baldwin, 1971).

My own observations of heavy steers being slaughtered by the kosher method indicated that many animals still had eye blink reflexes about 5 seconds after the throat was cut. Rowsell (1979) reported that 56% of the sheep

TABLE 1 — Number of seconds after the throat is cut to the onset of unconsciousness and cortical death as determined by the EEG

	Sheep[1]	Calves[1]	Cattle[2]
Unconsciousness	3.3-6.2	4.4-6.9	10
Cortical Death	20.8-35.4	18.8-139.2	120-150

1) Nangeroni & Kennett (1963)
2) Levinger (1979b)

slaughtered by the kosher method lost the blinking reflex within 15 seconds but that the time for individual animals varied from 5 to 75 seconds after having their throats cut. In adult cattle, the blinking reflex persisted for 27 to 32 seconds. However, the blinking reflex is not a reliable indicator of the onset of insensibility in kosher slaughter although it is valid in the use of the captive bolt stunner (Grandin, 1980b; Rowsell, 1979). It has been reported that week-old calves killed by the kosher method would respire, vocalize and show both palpebral and corneal reflexes when the EEG recordings indicated that they were unconscious and

insensible to pain (Blackmore *et al*, 1979). Levinger (1979b) and Nangeroni and Kennett (1963) also report that reflexes continued to be exhibited after the cessation of cortical activity.

There are several factors which could possibly prolong consciousness after throat-cutting. Thornton (1958) warned that unconsciousness could be delayed if the ends of the severed arteries sealed themselves off, or alternatively, if the blood supply from the vertebral arteries was sufficient (Baldwin, 1971). For instance, the vertebral arteries provide a greater proportion of the blood supply to a bovine's brain than to a sheep's brain. Suspending animals upside down after cutting the throat could also prolong consciousness since the blood would tend to pool in the head and maintain a sufficient oxygen supply for a few moments. However, this is a topic which needs to be researched using the EEG. It can be definitely concluded that the animal remains conscious for several seconds after having its throat cut.

Several authors report that bleeding, with or without stunning, increases the output of catecholamines, sometimes to a greater extent than other stressful procedures such as trucking (Althen *et al*, 1977; Kilgour, 1976; Ratcliff, 1971; Warriss, 1978). The data definitely indicate that cutting a conscious animal's throat is stressful. It is vital that animals which have to be slaughtered for religious or other reasons without prior stunning should have both carotid and jugular blood vessels severed simultaneously to ensure rapid bleeding. In order to minimize pain, the edges of the wound should not touch until the animal becomes unconscious (Levinger, 1979b) and the shochet must be skillful. I have observed large steers walking around for over 60 seconds after their throats were cut by an unskilled shochet.

The kosher and Moslem slaughter methods are probably the least painful techniques of throat-cutting for conscious animals, provided a humane restraining device is used. For adult cattle and older calves, the kosher method would be acceptable from a humane standpoint under these conditions. For sheep, the method is probably relatively painless and is quick and humane. Stunning sheep correctly with electricity takes skill. For young calves, the kosher technique presents problems from the humane standpoint because of the long time before onset of unconsciousness. Electric stunning has been tried but stunning on the head only is unacceptable because a proportion of the young animals regain sensibility prior to or during bleeding (Blackmore and Newhook, 1980). In some countries, stunning is acceptable to religious authorities provided that the heart remains beating. Humane electric stunning must produce cardiac arrest and is not, therefore acceptable to many religious authorities. An exception has been made recently in New Zealand, where Moslem authorities have agreed to the use of electric stunning for young calves. This method does not reduce bleedout (Blackmore, 1980, personal communication). Moslem authorities in both New Zealand and Australia accept nonpenetrating captive bolt stunning for adult cattle.

The Humane Concerns—Shackling and Hoisting

Approximately two million heavy beef steers, one million sheep and half a million calves are slaughtered annually for the kosher trade in the United States.

This represents about 5% of the heavy steers and mature cattle slaughtered in the United States. From the humane standpoint the slaughter itself is not necessarily a problem. The main concern is with the methods used to restrain animals prior to slaughter, especially in the U.S. Many of the kosher plants suspend fully conscious animals upside down by a chain attached to one hind foot. A restraining pen, available through the American Society for the Prevention of Cruelty to Animals (Figure 1), is available for restraining large heavy steers, but at least 25% of these animals are still shackled and hoisted. Although the restraining chute is unsuitable for some plants, unwillingness to spend the extra money for the sake of humaneness is another reason why some plants have not had it installed. Almost all calves and lambs are shackled and hoisted. In fact, one of the reasons why kosher slaughter was exempted from the 1978 Humane Slaughter

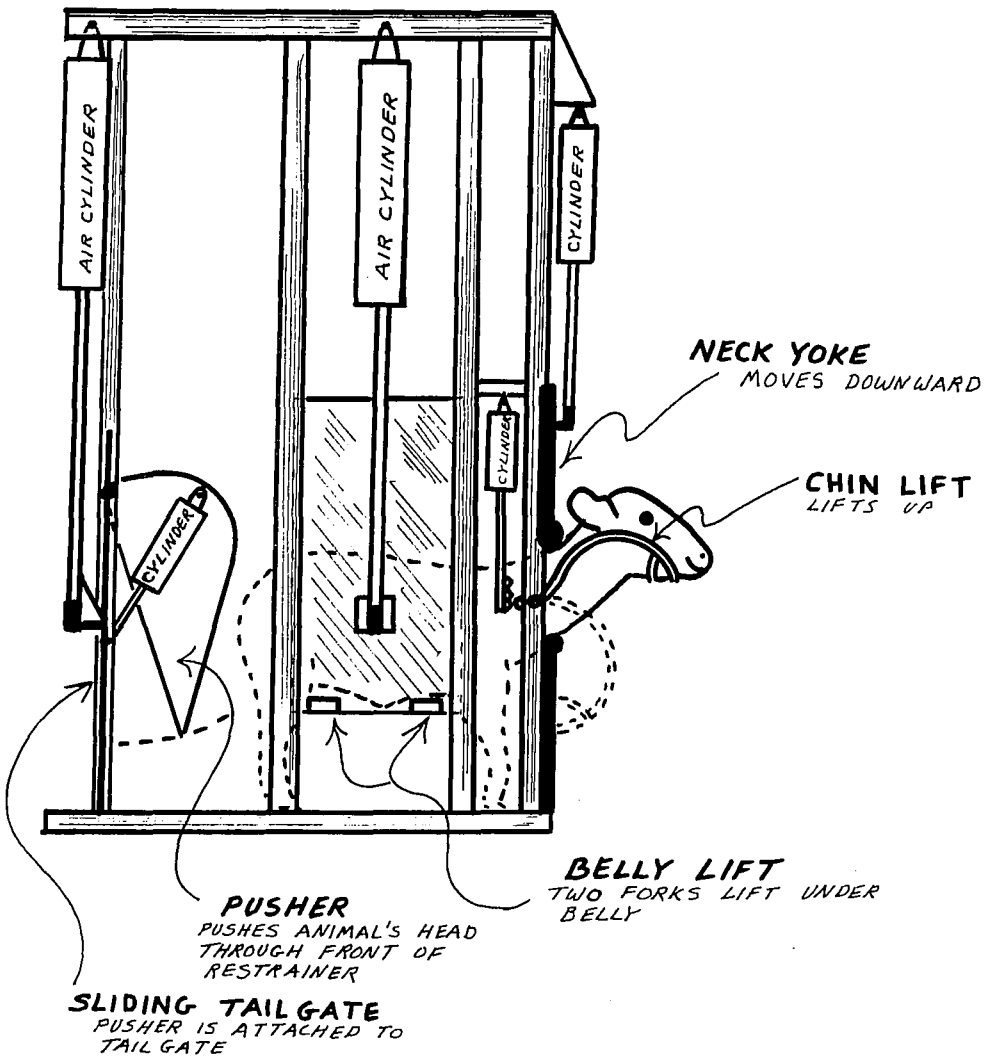

FIGURE 1 — ASPCA Pen diagram.

Act was that humane restraining equipment was not available for sheep and calves.

The procedure involved in shackling and hoisting is as follows: Each animal enters a narrow stall equipped with a movable bottom which is tilted to cause the animal to trip and fall down, whereupon a chain is slung round one back foot. The bellowing, writhing steer is then yanked up in the air. The chain causes trauma to the animal's leg approximately 50% of the time and the tissue damage is undoubtedly painful to a conscious animal. In addition, it must be extremely painful for a 1,200 lb. animal to be hung upside down. The weight of the fluid in the rumen bearing down on the diaphragm sometimes causes the animals to vomit. In some plants, up to five steers or calves can be hanging up at any one time waiting to have their throats cut. Employees wearing football helmets and face masks to prevent themselves from being injured by the thrashing animals then attach a clamp to the animal's nostrils. After the clamp is attached, the steer's neck is stretched out by a powerful air cylinder attached to the clamp by a cable. Figure 2 illustrates the tremendous strain placed on the animal's neck by this technique. In addition, it should be noted that the nostrils are a sensitive part of the animal, evidenced by the fact that only a slight amount of pressure on the nose-ring of a bull is required to control the animal.

The procedure causes tissue damage to the hind leg, and the jerking of the limbs of live animals would thus seem to violate the principles expressed in some passages of the Talmud and Bible. Any type of injury to the animal prior to

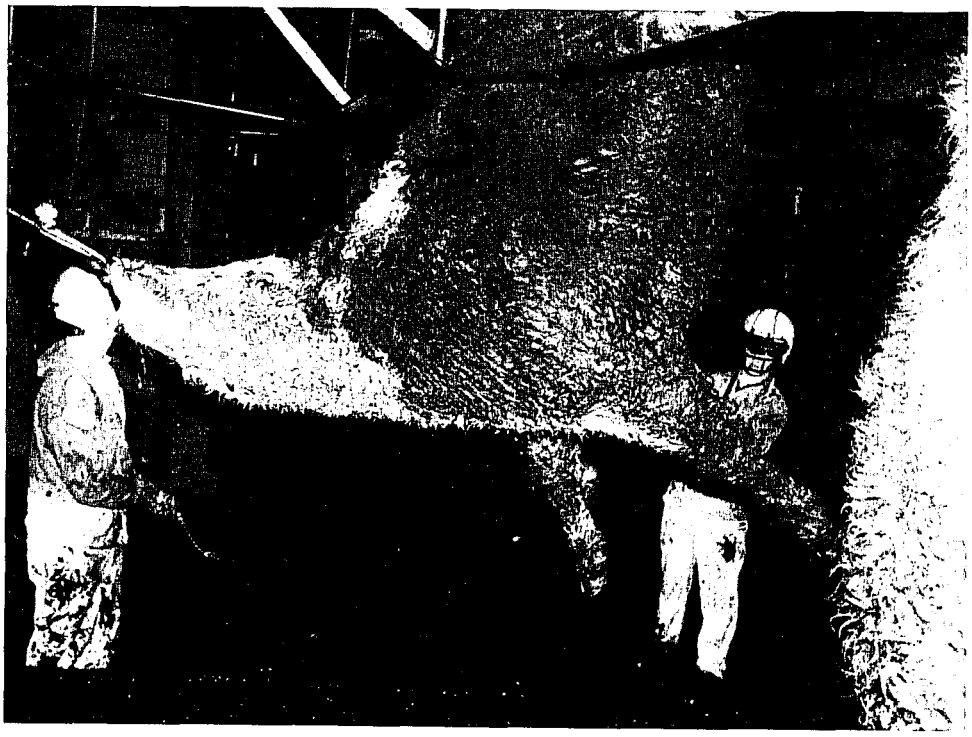

FIGURE 2 — Animal which has been shackled and hoisted in preparation for kosher slaughter. The animal's neck is stretched with a tong placed in the nose.

shechitah constitutes a blemish. Furthermore, Shoshan (1971) in his book on *Animals in Jewish Literature* states: "it is not permissible to tie up the legs of any animal or bird in a way which is apt to cause pain."

Why does the American Jewish community tolerate a practice which defiles a sacred ritual? In fact, many shochets are disturbed by shackling and hoisting. The Board of Directors of the United Synagogue of America voted in 1965 to "endorse any state legislation which, while declaring Shechitah humane, would outlaw shackling and hoisting of larger animals" (Laub, 1966). However, the problem has economic and social aspects which complicate its resolution. Shackling and hoisting for kosher slaughter represents a clash between ancient ritual and modern technology. When the ritual was instituted, animals obviously were not handled according to the principles and practices of an industrialized society. Before the advent of large, high speed slaughter plants, each animal was cast on the ground for slaughter. This is no longer permitted in modern plants for sanitary reasons (Laub 1966). The U.S. Department of Agriculture does not permit animals to be bled while lying on the floor unless the floor is completely washed down after each animal. This is not practical in a plant which slaughters 40 to 100 cattle per hour or several hundred calves or sheep per hour.

Some kosher slaughter plants use shackling and hoisting because a minimum of capital investment is required, and it is sanitary and relatively efficient. Many plants are not willing to spend money to make their operation more humane, unless humaneness makes a profit. Laub (1966) reported that plants refused to install the ASPCA restraining pen and that they would only do so under compulsion of law. Another problem is that some plants jump in and out of the kosher market, and they can shackle and hoist for kosher slaughter with only minimal modifications in their present stunning pens.

A technological society also creates affluence, which tends to put distance between the consumer and the process used to make the product. Most Orthodox Jews in the United States have not witnessed slaughter operations. This is especially true of the younger generation. I interviewed a young Orthodox Jew who had no idea of what was occurring in some kosher slaughterhouses. She could not believe what she was told about shackling and hoisting and became extremely upset when shown a picture of a shackled steer. If Jewish consumers were made aware of how their sacred ritual has been corrupted in some plants, they would demand a stop to it. One large kosher slaughterhouse stopped shackling and hoisting and installed two ASPCA restraining pens because housewives picketed the grocery stores which owned the plant.

Although shackling and hoisting prior to kosher slaughter is practiced on a large scale in the United States, it is forbidden in most European countries (Carding 1971). In Canada, the practice is not permitted, nor is kosher slaughter exempt from humane slaughter laws.

The Kosher Meat Trade

Only the forequarters of heavy steers killed by kosher methods will be stamped kosher and sold on the kosher market. This is because the hindquarters must be deveined according to Jewish dietary laws and this is too time-consuming and costly. In addition, the entire carcass of approximately 30% of all

ritually killed animals is declared 'tref' (unkosher) and sold on the regular market. Another 10-20% of ritually killed animals may be diverted into the regular trade to fill regular orders since most kosher slaughter plants sell both kosher and regular meat. In the final analysis, at least 65% of all the meat from kosher killed livestock in the U.S. is sold on the regular market.

Kosher Slaughter Restraining Systems

The first restraining system which was developed for large cattle was the Weinberg Casting Pen, a European invention. After the animal enters the pen, the entire pen is rolled over and tilted 180 degrees. The animal ends up on its back with its head protruding through the front opening. The Weinberg Casting Pen has a maximum capacity of 30 animals per hour and is better than shackling and hoisting for kosher slaughter, but there are other types of restrainers which are less stressful.

The next major advance in restrainer design was the ASPCA pen which can be licensed, royalty-free, to any plant which desires to use it. (Figure 1). The pen was originally invented by Peter Hoad of Canada Packers Ltd. The belly lift was added by Cross Brothers Packing in Philadelphia. They obtained a U.S. patent and then sold the patent rights to the ASPCA. The pen consists of a stall with an opening in the front for the animal's head. After the animal enters the stall, a bumper pushes the animal forward, forcing the head through the front opening. A yoke then descends, locking the head in position and a lift comes up to support the animal under its belly.

A chin lift then raises the animal's head and stretches the neck for the shochet. After the throat is cut the side door of the ASPCA pen is opened, the shackle is attached to the rear leg, and the animal is pulled out of the stall. The side door is then closed and the pen is ready for the next animal.

The design of the head holder is very important; otherwise the pen will not be acceptable to the rabbinical authorities. There must be sufficient clearance so that the shochet's knife will not touch the chin lift. This lift can be used on many different types of restrainers.

There have been some problems with the ASPCA pen. All of the moving parts of the pen are controlled by air cylinders, and operators commonly use too much air pressure for the rear bumper and belly lift. The ASPCA pen causes relatively little stress only if a skilled and conscientious person operates it. Most of the problems which occur with the ASPCA pen are caused by trying to go too fast. This is a management rather than a design problem. However, the pen is mechanically complicated and will usually not reduce labor requirements over a shackle and hoist system.

a) New large animal restrainers

Restrainer designs which rely on gravity to restrain the animal instead of moving parts propelled by air cylinders make it nearly impossible for people to hurt an animal by squeezing it too hard or knocking it around in the restrainer. This idea originated from a restrainer that Cincinnati Butcher's Supply Co. built but never developed into a workable form. I adopted the idea for use in kosher slaughter (Grandin, 1977).

The steer or bull enters a restrainer which consists of solid metal sides forming a V. After the animal is in the restrainer, it is lifted up by two air cylinders and suspended in the V with its feet protruding through the bottom. Refer to Grandin (1980c) for a diagram of the lifting restrainer. The lifting restrainer holds the animal in exactly the same manner as the conveyor-V-restrainer which is described in Grandin (1980c). As the restrainer is lifted up it also tilts forward, causing the animal's head to slide through the front head opening. The opening would be funneled to guide the steer's head through the front. This feature eliminates the belly lift and rear bumper which may cause injuries. After the restrainer is in the fully raised position the animal's head is restrained in a standard kosher head holder.

While the shochet is making the cut, the shackler can attach the shackle to the rear leg. After a pause of several seconds for the animal to lapse into unconsciousness, the head holder is released and the animal is hoisted straight up through the top of the restrainer. The restrainer then returns to the floor and is ready for the next animal. Another advantage of this design is that the restrainer moves away from the blood pit when it resets itself for the next animal. This would make it possible to rinse the blood off the restrainer automatically after each animal, without running water into the blood pit. Cattle will enter the restrainer with less hesitation if the blood is washed off. (Grandin 1975).

Either the shackler or the drover would push a switch to close the tailgate after the animal entered the lifting restrainer. After the tailgate had closed it would activate a solenoid valve which would start raising the restrainer. Once the restrainer had reached the fully raised position the head holder would restrain the animal's neck for the shochet. There would be a manual override switch in case the animal was in the wrong position. After the throat was cut the shackler would activate the hoist to lift the animal out of the restrainer. Activating the hoist would also activate a switch which would open a solenoid to release the head holder and then lower the lifting restrainer and reset it for the next animal. In order to prevent the shackler from starting the hoist before the animal had lost consciousness a time delay can be built into the equipment. When the shochet steps away to wash his knife he would trigger a five second timer. The shackler could not activate the hoist until the 5 seconds had elapsed. After the animal was lifted from the restrainer and it had returned to the reset position, the tailgate would automatically open for the next animal. This automation can be accomplished with standard industrial switching devices.

This restrainer could also be highly automated to save labor and force the operators to handle the cattle gently. Many plants refuse to replace their current shackle and hoist kosher system with the ASPCA Pen because there is no economic incentive, but automation of the lifting restrainer would eliminate the need for an operator and thus save labor costs.

A conveyor-restrainer system with a head holder was recently installed at Spencer Foods in Iowa for kosher slaughter of large beef cattle. (Figure 3). Up to 214 cattle per hour can be slaughtered in this system (Grandin, 1980d). A standard conveyor-restrainer, described in Grandin (1980c) was used.

A hold down rack is installed along almost the entire length of the conveyor-restrainer to hold the animals in the conveyor until they reach the head holder which is located at the discharge end of the restrainer. The operator of the system

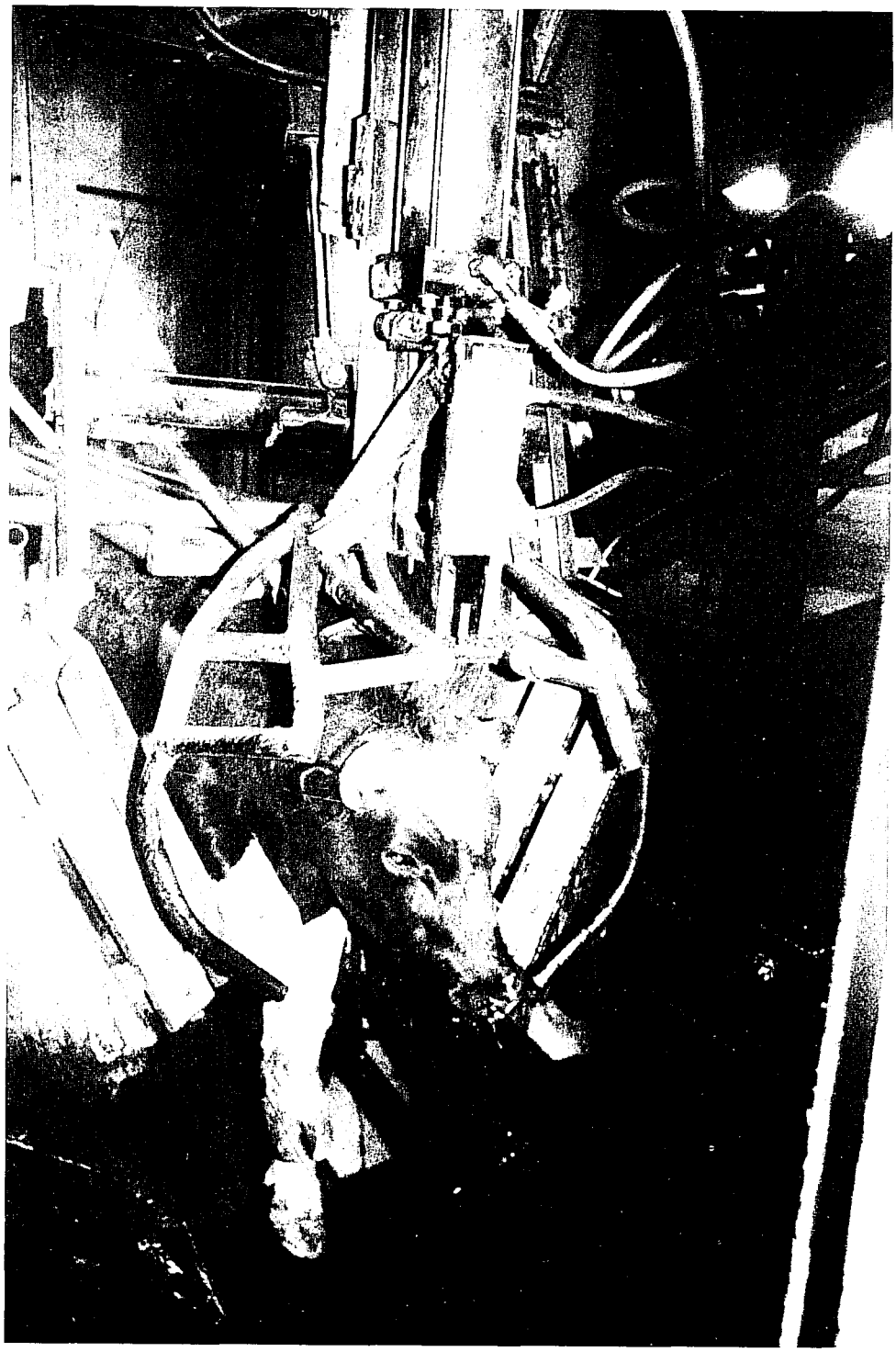

FIGURE 3 — New kosher restrainer system. Head holder on the end of the restrainer-conveyor is ready to catch and lift the animal's head for kosher slaughter.

can stop, start or reverse the conveyor-restrainer with foot controls. Hand controls are used to operate the head holder. After the restrainer is stopped, the animal's head is caught in a clam shell-like cage. When the cage is lifted the animal's neck is stretched for the shochet. The head holder is powered by both hydraulics and air. A hydraulic cylinder is used to raise and lower the clam shell to facilitate precise positioning. Air is used to power the clam shell because it moves the clam shell quickly.

After the shochet makes the cut the clam shell opens and releases the head. The animal is discharged onto a downward sloping take-away conveyor similar to ones illustated in Grandin (1980c). The rubber belt is sterilized every time it makes a revolution. A stainless steel box under the take-away conveyor catches the sterilizing water and prevents it from diluting blood in the blood pit. Animals are shackled and handled in the same manner as a standard conveyor-restrainer system.

The new restrainer is much more humane than the old shackling and hoisting system. It also reduces labor requirements and provides safer working conditions for plant employees. In the old shackling and hoisting system three employees were required to hold the animals' heads. With the restrainer these 3 people are no longer needed. The labor savings and reduction in bruises will enable the plant to pay for the restrainer and the new building which houses it in three to five years. In plants where this system could be installed in an existing building, it would pay for itself in two years.

b) Restrainers for small animals

A University of Connecticut research team (Giger *et al*, 1977) developed a double rail restraining system for kosher slaughter of calves and sheep. This system could also be used for Australian or New Zealand type slaughter of sheep. In the double rail system the animal straddles two rails. The double rail is especially recommended for small calves because they will either fall through or cross their legs in a V restrainer. The double rail is mechanically simpler and it would be easier to keep clean. Research indicates that the double rail is less stressful than shackling and hoisting, especially in the heavier calves (Westervelt *et al*, 1976).

The double rail concept could be used in three types of system. A small system where each animal is placed in the restrainer singly, a semi-automatic system for up to 225 animals per hour, or a continuous large automated system where up to 200 calves or 400 sheep per hour could be slaughtered. It could also be used for kosher, Moslem and regular slaughter where the animals are stunned. Figure 4 illustrates the working of the system.

Conclusion

From the standpoint of humaneness, the problem with kosher slaughter is not in the killing method per se, but in the preslaughter handling technique of shackling and hoisting heavy, fully conscious animals. The slaughter ritual was developed in a preindustrial society, and the handling methods were designed not only to adhere to the commands of the Torah concerning food animal slaughter, but also to ensure humane treatment of the animals. Humaneness, a

FIGURE 4 — Double rail restrainer: neck stretched and ready for shochet.

central tenet of the Jewish attitude toward animals, has become an issue in kosher slaughter only since the advent of large, high speed plants which must conform to secular standards of hygiene as well as to the religious proscriptions of the ritual. Thus a situation has developed in which the spirit of the ritual has been lost or perverted in the attempt to preserve ancient practices in a modern, highly technological setting.

However, although technology has in a sense created the problem, technology, or rather its proper application combined with some creative thinking, may be able to solve it as well. The evidence indicates that ritual slaughter can be at least as humane as other systems, provided that the shackling and hosting of large animals is replaced by some other kind of restraining device which will hold the animals in the correct manner according to Talmudic instruction and also spare the animal undue stress and suffering. The automatic conveyor-restrainer described above achieves these goals and has the added advantage of reducing labor costs.

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