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(57) Abrégé/Abstract:
Shipping containers and systems for transporting livestock on shipping vessels over extended periods and methods for shipping livestock over extended periods including features for water distribution, feed distribution, temperature control, air movement, and waste management.
Title: SHIPPING CONTAINERS AND METHODS OF TRANSPORTING LIVESTOCK

Abstract: Shipping containers and systems for transporting livestock on shipping vessels over extended periods and methods for shipping livestock over extended periods including features for water distribution, feed distribution, temperature control, air movement, and waste management.
SHIPPING CONTAINERS AND METHODS OF TRANSPORTING LIVESTOCK

This International Patent Cooperation Treaty Patent Application claims the benefit of each of United States Provisional Patent Application No. 61/371,123, filed August 5, 2010,

FIELD

The present embodiments generally relate to the field of shipping containers, and more particularly to shipping containers for transporting livestock, methods and systems for transporting livestock.

BACKGROUND

As beef, dairy and other livestock industries develop around the world; various market demands generate a need to transport livestock over great distances. In some cases transoceanic and intercontinental shipments may be desirable. Such shipments can be made relatively quickly by airborne transport, but at a great expense, especially for heavier cargo. For heavier cargo, such as livestock, a need exists for waterborne transport which can take between four days and forty five days or more to arrive at a final destination. Therefore, a need exists for a specialized shipping container and method for shipping livestock over extended periods.

Unlike typical cargo, livestock require a steady supply of suitable food, water, air and at least some level of climate or temperature control in order to promote good health. These basic requirements are further complicated by the fact that livestock produce waste during their confinement in shipping containers. Therefore, an unresolved need exists for a shipping container that promotes livestock health over the course of long shipments.

Major concerns in the shipment of livestock, or other animals, can include providing for a clean source of drinking water. Given the amount of water some livestock, such as bovine, consume daily, the additional space and weight of the drinking water can become
costly. Regardless of the water source, a further problem exists in that water must be reliably delivered to one or more shipping containers in an accessible manner, otherwise livestock will become dehydrated and may potentially die. In a transoceanic shipment, the shipping containers can undergo extreme weather conditions and exposure to extreme elements, such as salt water, freezing temperatures extreme heat, and extreme humidity. Therefore, a need exists for systems and methods for reliably supplying water to one or more shipping containers in extreme elements.

A further need exists for a shipping container which is modular requiring less space between containers and allowing a greater capacity for shipping containers on a shipping vessel, as well as for a shipping container which provides protected interior spaces for manipulating livestock feed allowing livestock to be regularly checked from the interior of the container and allowing for controlled feeding.

A need exists for a system of modular shipping containers configurable into arrays, which includes a robust water delivery system for providing water to each of the shipping containers in the system. A need exists for a water system adaptable to various configurations for the variety of potential shipping arrangements of the shipping container arrays.

Over the course of a long trip, solid waste will accumulate from livestock maintained in the confinement of a shipping container. Such an accumulation of waste can lead to the spread of disease and can generally adversely affect livestock health. Therefore, a need exists for a method of shipping livestock that promotes livestock health by minimizing the waste produced during shipment and minimizing the impact of the waste produced.

Still a further need exists for a modular shipping container which can be maintained for long periods on the relative isolation of a shipping vessel. The shipping container can include with an interior for efficiently compartmentalizing feed, feeders, partitions, water, and the like for sustaining livestock throughout a long shipment. A plurality of shipping containers can be placed on a shipping vessel in a variety of configurations, depending on the capacity and deck space of the shipping vessel. Therefore, a need exists for shipping containers with connections to ensure each shipping container in the plurality of containers can be supplied with both running water and with electricity.
Yet another need exists for a method of timing and inseminating livestock for shipping pregnant livestock that maximizes the successful birthrates achieved at the desired location.

Still another need exists for a livestock shipping container which is either self contained or forms a part of a network of shipping containers and has a reduced environmental impact on the port destinations as well as on the shipping vessels. For example, livestock waste materials are inevitably produced during a shipment, and a shipping container is desirable that contains the waste and prevents waste from affecting the surface of a shipping vessel or port location.

DISCLOSURE OF INVENTION

A broad object of particular embodiments of the present invention can be to provide a shipping container for the shipment of livestock over long distances, particularly for transoceanic shipments, which meet the needs set forth above. The shipping containers ensure the health and safety of livestock by providing both effective protection from the elements and sufficient ventilation from the waste produced by livestock, as well as a steady source of food and water. In one aspect, the shipping containers can be designed for easily accessing feed, for the purpose of regularly feeding livestock controlled portions throughout shipment.

Another broad object of particular embodiments of the present invention can be to provide a water delivery system for shipping containers used in the shipment of livestock. One broad aspect is a design for providing an uninterrupted clean supply of drinking water. In some aspects, drinking water can be stored in the existing ballast tanks of a shipping vessel, while in other aspects plastic tanks or bladders can be loaded in shipping containers, or liquid shipping containers can be filled with drinking water.

Still another broad object of particular embodiments of the present invention can be to promote healthier livestock throughout a transoceanic shipment with improved watering and feeding, in addition to improved waste management. In some aspects, the improvements relate to improved shipping containers and methods which both reduce the impact of waste on livestock during confinement for long periods. The method can include
the modification of shipping containers for reducing the impact of waste and improving livestock health while confined for shipment. The method can include the measured feeding of highly fortified pellets containing nutrients, antibiotics, and/or antidiuretics, thereby reducing the waste produced by livestock in transit. Electrolytes can be added to the livestock’s water in order to promote hydration, especially in livestock exposed to hot and humid weather conditions. The method can include the formation of an absorbent bed for managing waste produced in transit. In another embodiment, the shipping container provides adequate ventilation during the shipping of livestock. In particular, livestock waste can produce hazardous chemicals such as ammonia and carbon dioxide which can become hazardous to the livestock, particularly in hot and humid conditions. Proper air flow can be accomplished with ventilation openings in the shipping container in addition to fans configured to promote air movement thereby removing noxious fumes, as well as, heat from the livestock. One object can related to a temperature control for the livestock.

Another broad object of particular embodiments presented herein can be to provide containers which promote the health and well being of livestock being transported through climate control. In another aspect the health and well being of livestock can also be promoted through more temperature efficient containers.

Still another broad object of particular embodiments presented herein can be to provide a shipping container with an internal enclosure for livestock separated from a continuous opening in the interior space of the shipping container for attendants, whereby attendants within the continuous opening are protected from both external elements as well as the livestock being transported. Still further, feed can be stored within the continuous opening at a first area, inaccessible by livestock, and moved to a second area within the continuous opening, whereby livestock have limited access for feeding at the second area.

Yet another broad object of particular embodiments of the present invention can be to provide a method for loading multiple livestock shipping containers onto a shipping vessel and providing each shipping container with food, water, and electricity to promote the health of a large number of livestock being transported. In one aspect, the shipping containers can be lined up in vertical rows, horizontal rows, stacked, or any appropriate combination of all three, and a need exists for a robust water system for reliably delivering
water to each shipping container. In another aspect, this can include a system to keep drinking water from freezing.

Still another broad object of particular embodiments described herein can be to provide a method for shipping pregnant livestock. According to the demands of particular countries, it may be desirable to inseminate cattle before shipment, thereby providing two head of livestock, essentially, at the expense of shipping a single head. In order to help ensure pregnant livestock produce acceptable birth rates and birth healthy offspring, one aspect of the current invention is directed to reducing stresses on the pregnant livestock. In particular, one embodiment relates to the shipment of heifers gestating embryos.

Naturally, further objects of the invention are disclosed throughout other areas of the specification and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates an external isometric view of a shipping container in accordance with certain aspects of the present invention.

FIG. 2A-D illustrates internal and cross-sectional views of a shipping container in accordance with certain aspects of the present invention.

FIG. 3 illustrates an internal isometric view of a shipping container in accordance with certain aspects the present invention.

FIG. 4A-B illustrate cross sectional views in accordance with certain aspects of the present invention.

FIG. 5A-B illustrates a hopper in accordance with certain aspects of the present invention.

FIG. 6 illustrates a diagram of a system of shipping containers on a shipping vessel in accordance with certain aspects of the present invention.

FIG. 7A-C illustrates schematic configurations of arrays of interconnected shipping containers on a shipping vessel in accordance with certain aspects of the present invention.
FIG. 8A-C illustrates schematic configurations of arrays of interconnected of shipping containers and water delivery systems on a shipping vessel in accordance with certain aspects of the present invention.

FIG. 9 illustrates an arrangement of shipping containers on a shipping vessel in accordance with certain aspects of the present invention.

FIG. 10A-D illustrates schematics of electrical systems for multiple shipping containers on a shipping vessel in accordance with certain aspects of the present invention.

FIG. 11A-C illustrates an embodiment of stackable containers along with a spacer and a catwalk for accessing stacked containers.

MODES FOR CARRYING OUT THE INVENTION

Now referring primarily to FIG. 1, an external view of an embodiment of a shipping container 10 is illustrated. Particular embodiments relate to a shipping container 10 for transporting livestock, where the livestock can include one or more cattle, horses, sheep, goats, pigs, other domestic livestock, or exotic animals. The exterior of the shipping container 10 is illustrated with roof 12, a bottom 14, a front wall 16, a back wall 18, a first sidewall 20 and a second sidewall 22 forming an interior storage space. The front wall 16, back wall 18, first sidewall 20 and second sidewall 22 may be collectively referred to as the sides or a plurality of sidewalls, and it should be appreciated the terms, “top,” “bottom,” “front,” and “back” are only used as relative terms for identification relative to the other sides and that shipping containers can be configured with any number of sides or in any number of orientations.

Each of the sides can be constructed from metal connected to a metal frame, or from other materials known in the industry for shipping containers. As one non-limiting example, the shipping container can be constructed from corrugated steel on a metal framework. As another non-limiting example, the sides can be constructed from other suitable materials, such as fiberglass, plastics, alloys, or combinations thereof. The shipping container 10 can be dimensioned as a typical cargo shipping container.

By way of a non-limiting example, the shipping container 10 can be twenty, forty, forty five, forty eight, or fifty three feet long, eight feet wide, and nine and a half feet high.
It should be appreciated many shipping containers are eight or eight and one half feet tall, and these containers are also contemplated for use herein. In various countries containers can be slightly wider to accommodate different sized pallets. Each of the dimensional relations of containers for this purpose are also contemplated for use in the aspects presented herein, as well as other standard or useful dimensions, which have not been specifically identified. For example, the shipping container 10 can be about ten to about sixty feet long, about seven to about twelve feet wide, and about seven to about twelve feet tall.

The sides can be insulated, or coated, on their interior for the purpose of regulating the temperature of the shipping container. The coating can be water resistant and non-absorbent so livestock waste and fluids remain easy to clean from the container and so the shipping container is easy to disinfect. For example, the interior surface, or exterior surface, or both surfaces of the shipping container 10 can be coated with a reflective material for the purpose of reflecting light, as opposed to absorbing light and generating heat. Similarly, the interior of the shipping container can be coated with foam or another insulating material, such as a paint or film. The insulating material selected for the interior of the container can be water tight and non-absorbent so the interior surfaces remain easy to clean and disinfect in view of waste produced by livestock in transit. In another embodiment, the interior surfaces can be padded with cushioning elements for the safety and comfort of the livestock.

The bottom 14 can be sealed to form a water tight bottom, or to make at least a portion of the bottom watertight. The watertight bottom can provide the benefit of preventing urine and other waste from leaking onto a transport vessel, a dock, other shipping containers, or other locations. For example, the bottom 14 can be lined with a plastic or a rubber material which can be configured to overlie the bottom and portions of the front wall 16, back wall 18 and sidewalls. As one example, the bottom 14 can optionally include drain ports 31, 33, 35, 37 39. The drain ports can be sealed by a wing nut, a rubber plug, or by other sealing elements for draining waste fluids at a designated times and locations. As few as a single drain port can be used, and as many as sixteen or more drain ports can be configured symmetrically or asymmetrically on the bottom 14 of the shipping container 10. In one embodiment, a sealing foam can be used, around openings formed on the exterior of the container.
A bedding layer can be formed on the bottom 14 of the interior storage space. The bedding can include saw dust, wood shavings, pine chips, rice chips, hay, straw, powder and combinations thereof, which can be layered or can be mixed. The bedding can be formed over a generally water tight structure, which can include a concrete layer and/or a plastic and/or rubber, as well as, the drain ports described above. In one embodiment, the bedding layer can be selected for its ability to absorb fluid waste and reduce odors and can include, for example, sawdust and pine chips. In another embodiment the bedding layer can be formed to provide livestock cushioning within the container, such as hay or straw. Other suitable materials can be used for confining urine and other waste produced by livestock within the shipping container.

On the interior of the container 10, the bottom 14 can include a traction surface to assist livestock in movement within the shipping container in light of the relative motion the shipping container 10 undergoes on the open sea. For example, the interior of the bottom 14 can include rubber matting, a metallic grid, a metallic mesh, a rubber grid, a corrugated surface, crossbars and combinations thereof. Similarly, other surfaces can be used on the bottom 14 of the container in order to provide livestock with improved traction. Other materials and shapes can be used, so long as the shape allows livestock to gain footholds in the face of the pitch, roll and yaw of shipping vessels.

The front wall 16 can include a cargo gate 24, through which livestock can be loaded like any other cargo before the shipping container 10 is loaded onto a shipping vessel. The cargo gate 24 can have a first side 26 and a second side 28. The first side 26 of the cargo gate 24 can have an electrical box 30 including a port 32 for receiving power from a power source, such as 220 volt source or a 440 volt source. The electrical box 30 is illustrated connected to a circulation fan 34 for promoting circulation within the shipping container 10. A second fan 36 illustrated on the back wall 18 of the shipping container 10 and can also be connected to the electric box 30. The electrical box 30 can include a transformer to step down a voltage for consumption within the shipping container 10, as well as a controller for operating various electrical devices within the shipping container 10, such as the fans, and breakers and switches for each of the devices in the shipping container 10. The port 32 can comprise a weather proof female connection for receiving power, such as three phase 440
volts. Such weather proof connections are known in the maritime industry and weather proof connections suitable for use with the invention are available from ESL power systems out of Corona California.

Fans 34 and 36 are illustrated generally opposing each other on opposite sides of the shipping container 10 in order to maximize the air flow through the shipping container 10. In such an arrangement one of the two fans can be configured to push air through the shipping container 10, while the other can be configured to pull air through the shipping container 10. Such a cooperation between the fans permits an improved air exchange. The first fan 34 and second fan 36 can be provided in conjunction with the ventilation openings 40, 42, 44 to promote circulation in the shipping container 10. In one embodiment, the fans can be mounted in a configuration which promotes two-way air flow. In another embodiment, the one or more of the fans can be mounted at angles in order to promote circulation. In either arrangement, the fans and ventilation openings can provide between about 0.4 air exchanges per minute to about 12 air exchanges per minute, or greater than 2.5 air exchanges every minute. In another embodiment, shipping containers 10 can be stored in the hull of a shipping vessel, but may require as many as 30 air exchanges per minute.

Other configurations of fans are contemplated for use with embodiments of the shipping container 10, but the power and arrangement of the fans can be sufficient for maintaining air flow through the entire shipping container 10. In one embodiment a fan for pushing air can be fluidically connected to a fan pulling air by a conduit, such as a plastic tunnel. The conduit can include openings facing the livestock in order to ensure an even distribution of air movement. It should be appreciated in particular embodiments, widow air conditioning units can be used in place of fans to control temperatures and air circulation. In one embodiment one AC unit can be located towards the front of the shipping container 10 and a second can be located towards the back of the shipping container 10. The AC units can be powered in similar fashion as described for the fans from an external power source such as a generator.

The second side 26 of the cargo gate 24 can have a personnel opening 38. In order to compensate the shipping container 10 for the structural integrity loss due to this opening, the personnel opening 38 can be reinforced by a frame of tubular metal, metal plates, or other
suitable material. This personnel opening 38 provides access to the interior of the shipping container 10 and can be accessed by an attendant during the shipment of the shipping container 10 while housing livestock. The personnel opening 38 can be configured with a latchable door (not illustrated).

The first sidewall 20 and the second sidewall 22 can each provide a plurality of ventilation openings, for example three ventilation openings 40, 42, and 44, are illustrated on the second sidewall 22. The ventilation openings, in conjunction with fans, or other means of circulating air, can be used for the purpose of maintaining a desired air exchange rate within the shipping container. In one embodiment, the first sidewall and the second sidewall each include one or more ventilation openings to prevent ammonia or carbon dioxide from waste from impacting the health of livestock. Each ventilation opening can be reinforced with a frame of tubular metal or plates, or the like, along the interior of the opening. As one example, the ventilation openings 40, 42, and 44, can be reinforced with steel plates to ensure the overall integrity of the shipping container 10.

While the ventilation openings 40, 42, and 44 can provide a benefit regarding air circulation, they may present a problem in that inclement weather, such as rain, can add additional stress to already stressed, confined livestock. In order to address this, the first ventilation opening 40 is illustrated with a shutter 46 which can travel from an open position to a closed position. Each such ventilation opening can include similar shutters or other means for covering the openings. These shutters 46 can be open in order to promote air circulation or, in the event of inclement weather, can be closed to reduce rainwater and other elements from entering the shipping container 10 through the ventilation openings 40, 42, and 44.

Guides 48 can be welded across each ventilation opening in order to further reinforce each opening, as well as for keeping the shutters 46 in place. These ventilation openings 40, 42, and 44, in combination with the fans 34 and 36 promote air movement sufficient to reduce or prevent the accumulation of ammonia, carbon dioxide, and other gases in the shipping container 10. In order to promote circulation further, a plurality of shipping containers 10 can be placed in side-to-side relationship and spaced by between about 6 inches and about 12 inches or more. In another embodiment the roof 12 can have an air inlet
opening, which can be any number of shapes or sizes in order to promote air circulation. The air inlet can also be adjustable, or sealable.

Water can be supplied to the shipping container 10 through one or more water hoses 50, or water delivery lines, which is illustrated entering the shipping container 10 through a ventilation opening 44. The hose 50 can include piping and can be constructed from rubber, plastic, polyvinyl chloride ("PVC"), cross-linked polyethylene, another cross-linked polymer, or another appropriate material. The hose can also be replaced with a rigid piping system constructed from galvanized metal or another material. It should be appreciated the hose 50 can also enter the shipping container 10 from an inlet opening 52 or through a water connection formed in a side of the shipping container 10. The inlet opening 52 can be covered when not in use. The single hose 50 can be connected to a water trough, a nose operated water bowl, or the like, through a fitting such as a brass fitting. The first water trough or nose operated water bowl can be connected in series to additional water bowls or water troughs located in the same shipping container or in subsequent shipping containers.

The water hoses 50 on the interior of the shipping container 10 can be contained within a PVC, plastic, or rubber sheath which serves to prevent kinking in the line to help ensure an uninterrupted supply of water to the livestock. Any hoses or water delivery lines can be secured flush within the shipping container 10 and with durable fittings in order to avoid damage to the water system and potential injury to livestock being transported. It should be appreciated other sufficiently sturdy materials can also be used. The water connections and any water lines can be padded or insulated to prevent freezing, as well as, to prevent animals from damaging the lines by chewing on them.

FIGS. 2A-D illustrates four internal views of a particular embodiment of a shipping container 10 similar to the embodiment portrayed in FIG. 1 whereby similar elements are identified with the same reference numbers. FIG. 2A illustrates a cross sectional view of the shipping container 10 having a roof 12 a bottom 14 and four sides, including a front wall 16, a back wall 18, a first sidewall 20 and a second sidewall 22. The embodiments illustrated in FIG. 2A-D can incorporate exterior features illustrated in FIG. 1. The shipping container 10 includes an internal structure for separating a livestock storage area 62 from a feed storage area 64, whereby the livestock storage area 62 comprises the area enclosed by this internal
structure within the interior storage space and the feed storage area 64 comprises a continuous opening on the exterior of the enclosure formed by the internal structure.

The internal structure can be a feed partition 66 as illustrated in FIG 2A-D physically separating the livestock storage area 62 from the feed storage area 64. The livestock storage area 62 can also be considered an enclosure formed by the feed partition 66. The feed storage area 64 can be considered the continuous opening outside the livestock storage area 62, or the remaining interior storage space which is defined by the interior of the shipping container 10 and the exterior of the feed partition 66.

The feed partition 66 can include a horizontal partition 74 and a vertical partition 76 for creating the boundaries of the livestock storage area 62 and the feed storage area 64. The horizontal partition 74 can adjoining both the vertical partition 76 and the second sidewall 22; defining, at least in part, the substantially horizontal overhead space 61 above the feed partition 66. Feed 72 can be stored in the substantially horizontal overhead space 61 of the feed storage area 64 above the livestock storage area. The vertical partition 76 can connect the bottom 14 of the shipping container 10 to the horizontal partition 74 and define, at least in part, the substantially vertical sidewall space 63. The vertical partition 76 can comprise vertical spaced members (seen in FIG. 2B) according to the livestock to be transported. By way of a non-limiting example, the vertical spaced members 79 can be spaced between about a foot and about two feet for bovine. The spacing provides livestock such as bovine sufficient room to access some portion of the feed storage area 64. The feed storage area 64 can include both the substantially horizontal overhead space 61, which can be defined, at least in part, by the interior of the top 12 of the container and the horizontal partition 74 and a substantially vertical sidewall space 63, which can be defined, at least in part, by the interior of the shipping container at the first sidewall 20 and the vertical partition 76.

The feed storage area 62, stated differently, can include both the substantially horizontal overhead space 61, which can be defined, at least in part, by the interior of the top 12 of the shipping container 10 and the horizontal partition 74 and a substantially vertical sidewall space 63, which can be defined, at least in part, by the interior of the shipping container 10 at the first sidewall 20 and the vertical partition 76.
In the illustrated embodiment the substantially vertical sidewall space 63 defined by
the vertical partition 76 can include a trough 68 and a catwalk 70, while in another
embodiment the vertical partition 76 can run the height of the shipping container 10 forming
a sidewall space which can store hay or sacks of pelletized feed, or grains (See FIG. 4). In
yet a different embodiment, the horizontal partition 74 can include openings allowing
livestock to access feed such as hay, stored in the substantially horizontal overhead space
61. While in another embodiment, the horizontal partition 74 can be a solid surface isolating
the substantially horizontal overhead space 61 from the livestock. In this embodiment, feed
can be moved periodically into the trough 68 in the substantially vertical sidewall space 63
of the feed storage area 64 for access by livestock. In another embodiment, the horizontal
partition can be solid, but with a few cut away portions for moving hay or bedding into the
livestock storage area from the substantially horizontal overhead space 61. In yet another
embodiment, the horizontal partition 74 can include a railing around the edges in order to
prevent items stowed above the livestock storage area 64 from falling during transit.

FIGS. 2A and B illustrate a crossbeam 78 that can provide stability between the
vertical spaced members 79. The crossbeam 78 can be located at an elevation permitting
livestock access to a trough 68. In another embodiment, a plurality of crossbeams 78 can
prevent livestock from accessing certain portions of the substantially vertical sidewall space
63 of the feed storage area 64. The exception being a space left open near the bottom 14, for
access to the trough 68. The spacing of any plurality of crossbeams 78 can provide enough
room for livestock to access the trough 68 on the other side of the feed partition 66, while
preventing livestock from reaching spaces that might be used by attendants.

The trough 68 can be located at the bottom 14 of the container 10 in the substantially
vertical sidewall space 63 of the food storage area 64 and can remain accessible to livestock
in the livestock storage area 62. The trough 68 can be filled with hay, grain, pelletized feed,
or compressed hay and combinations or rotations thereof. The trough 68 can hold a specific
volume of feed for periodically feeding the transported livestock in measured portions. In
one embodiment, the trough 68 can be mounted along the first sidewall 20 or second
sidewall 22, either directly to the sidewall or along the bottom 14 adjacent to the sidewall.
In one embodiment, the feed 72 can be separate from the livestock and distributed into the trough 68 in measured portions. Such portion control can help prevent excessive waste from being produced, which can adversely affect health of the confined livestock. In one non-limiting embodiment the feed 72 can comprise pelletized feed. The pelletized feed can be fortified with nutrients, antibiotics, antidiuretics, or the like to help ensure the health of the livestock. Similarly, the livestock drinking water can be fortified with electrolytes in order to promote hydration. The feed 72 can be stored in the substantially horizontal overhead space 61, which can be loaded with enough feed 72 for between four and forty five days.

A catwalk 70 can be formed above the trough 68 generally on the exterior of the enclosure formed by the feed partition 66 in the substantially vertical sidewall space 63 of the feed storage area 64. The catwalk 70 can extend across a portion of the trough 68 or along the entire length of the trough 68. The catwalk 70 provides sufficient room for livestock to access feed in the trough 68 and can be sufficiently wide for an attendant to walk on, thereby providing access to feed located above the horizontal partition 74. Further, the catwalk 70 can be constructed from elongate members 75 spaced apart and secured to a frame. In one embodiment, the elongate members 75 can be spaced apart in a side-by-side relationship. The spacing of the elongate members 75 can allow grain or other feed to pass through into the trough 68 below while being poured from bags stored above the livestock storage area 62. In this way, an attendant can enter the interior storage space, separated from the livestock, reach feed stored above the enclosure of the feed partition 66, and transfer feed 72 into the trough 68, where the trough 68 is accessible by the livestock. This combination of a feed partition 66 and catwalk 70 provides an efficient use of space with improved safety for personnel, such as attendants responsible for feeding livestock.

In a non-limiting alternative embodiment, a catwalk 70 can comprise planks supported on top of the trough 68, or suspended above the trough 68. The planks can comprise openings, such as holes or slots for the passage of feed into the trough 68. Other catwalk 70 configurations are contemplated for use herein, so long as the configuration is sturdy enough to support an attendant, with sufficient openings for filling a trough from above.
In one embodiment, the trough 68 can be refilled periodically by personnel from the catwalk 70. Feed 72, such as pellets, can be accessed from the catwalk 70 and poured directly into the trough 68. The illustrated catwalk 70 can provide spaced elongate members 75 which allow pellets to slide past into the trough 68. Other configurations of catwalks 70 are contemplated for use herein. One embodiment can include planks with openings for feed 72. The openings can be in the form of holes or slits. The catwalk 70 can be constructed in a sufficiently sturdy manner for holding multiple personnel at a time. Regardless of the configuration of the openings in the catwalk 70, the openings can be configured to avoid feet, other body parts, or articles of clothing from becoming stuck in the openings.

Water bowls 80 can be placed adjacent to the trough 68, such that livestock can access water stored therein. Water bowls 80 can be placed at either end of the trough 68 as well as between two troughs. The water bowls 80 can be placed in any configuration to provide access to water for livestock in the shipping container 10. FIG. 2C, illustrates one embodiment, where the water bowls 80 comprise a first nose operated water bowl 80a and a second nose operated water bowl 80b placed on either side of a first trough 68a. A third nose operated water bowl 80c and a fourth nose operated water bowl 80d can be placed on either side of a second trough 68b, each along the first sidewall 20. A fifth nose operated water bowl 80e is illustrated on the opposite second sidewall 22. Nose operated water bowls can provide the benefit of a constantly available water supply, and can utilize a pressurized source of water. As described below, the shipping containers 10 can include water lines in series, in parallel or in a combination thereof. A pump can be utilized to pressurize water lines. The water bowls can also be operated with a float valve, which automatically retains a certain level of water in the bowl. In this way, livestock can always have water available, while keeping the majority of the water supply fresh and without recirculating exposed water. Other valves and livestock water delivery devices known to those in agriculture and livestock can also be incorporated herein.

Water troughs or other water containers can also be used in place of the water bowls 80. In a particular embodiment an external source of water serially supplies each bowl in a shipping container, while in another embodiment water can be stored within each shipping
container and supplied to the water bowls therein. In another embodiment brass fittings can
be used to connect each water bowl to a waterline; preventing livestock from damaging the
connection; however, the invention is not so limited, and PVC or other materials can be
utilized for connecting the water supply.

In another embodiment, each shipping container 10 can include a water tank. For
example, a water tank can be located inside the shipping container 10 which can contain
about 100, about 200, about 400, or even up to about 1000 gallons of water. Smaller water
tanks can be used to supply individual livestock or groups of livestock within the shipping
container 10. Each of the water tanks, or even a bladder, can be filled prior to departure
from a first port, or can be filled during the voyage from a water supply on the shipping
vessel. A heating element can be coupled to the water tank in order to prevent water from
freezing. The heating element can include a propane unit, a solar unit, or an electric unit. In
another embodiment, the proximity of the livestock to the tank, and any water lines
connected to the water tank, can provide body heat helping to prevent water from freezing in
the water tank or in the water lines.

In order to maximize both the livestock storages area 62 and the feed storage area 64,
the interior of the shipping container 10 can form the remaining sides of the livestock
storage area 62. This feed partition 66 can be constructed from materials such as metal,
tubular steel, tubular aluminum, wood, plastic or the like.

FIG. 2B provides a sectional view of the shipping container 10 highlighting a
ventilation opening 40. This ventilation opening 40 permits air flow, which can vent away
ammonia, carbon dioxide, and other gases produced by livestock or other sources during
transport. The efficiency of the ventilation opening 40 can be increased with the use of a
ventilation fan or multiple ventilation fans. The ventilation opening 40 while illustrated as a
single opening is not intended to be limiting, and embodiments can provide a series of
openings in the sidewalls of the shipping container 10. Regardless of the configuration of
the ventilation opening 40, any openings in a shipping container can be sufficiently
reinforced to offset removed portions of the shipping container. Embodiments having a
single continuous opening along one side of the shipping container can be reinforced
accordingly with materials such as metallic tubing, aluminum or steel, plastics, or the like.
Two or more ventilation fans can be arranged to promote ventilation by providing more than one air flow path in the shipping container 10. Referring back to FIG. 1, a circulation fan or a first fan 34 is located opposite a second fan 36. In such an embodiment one can be configured to push air, while the other fan can be configured to pull air to achieve a desired exchange rate of air within the shipping container 10. In other embodiments the fans can be located on the same side. Both fans can be configured to push air through the shipping container 10, or both fans can both be configured to pull air through the shipping container. In one embodiment, fans can be connected by a conduit, such as a plastic conduit, that has holes for evenly distributing airflow throughout a shipping container. External curtains or shutters, (as shown in FIG. 1) can be placed on the exterior of the ventilation opening 40 to adjustably prevent precipitation and other elements from disturbing livestock within the shipping container 10. At a minimum, the shutters can greatly reduce the exposure of livestock to the weather.

FIG 2C provides a top view of the interior of the shipping container 10 which demonstrates the separation between the livestock storage area 62 and the feed storage area 64. The livestock storage area 62 can further be divided into a first compartment 112 and a second compartment 114 by an enclosure gate 110, which can be located midway between the opposing end walls. The enclosure gate 110 can serve to divide livestock in the livestock storage area 62 into to roughly equal groups for the purpose of weight distribution and feed distribution within the shipping container and can further provide a more predictable center of gravity of lifting the shipping container 10. The weight of some livestock in combination with the motion of the open sea provides an incentive to provide secure latches on the enclosure gate 110, as heavy livestock can generate significant amounts of force in response to the motion of a shipping vessel. In one embodiment a plurality of enclosure gates can be incorporated to partition the livestock in numerous spaces. For example, the livestock can be partitioned into individual spaces. The enclosure gate 110 can be hinged at either the second sidewall 22 or at an interior portion of the feed partition 66. Alternatively, the enclosure gate 110 can be provided on its own frame. The enclosure gate 110 can further include a cut away portion for the fifth nose operated water
bowl 80e, so livestock in both the first compartment 112 and the second compartment 114 can access a common water bowl 80e.

Feed partition 66 can have a vertical partition 76 adjacent and generally parallel to the first trough 68a and second trough 68b, as well as first sidewall 20 and second sidewall 22. The feed storage area 64 can be widened towards the front wall 16 in order to accommodate a personnel opening 38 (seen in Fig 1). Widening portion 108 can about the front wall 16, but generally still permit the opening and closing of the cargo gate doors, or the widening portion 108 can be separated from the front wall 16 by space. Generally, if the widening portion 108 is included, any gap can be configured to be smaller than any livestock carried in the first compartment 112. In this way, personnel, such as attendants, can enter the shipping container 10, access the catwalk 70 above the trough 68 in substantially vertical sidewall space 63 between the first sidewall 20 and the feed partition 66 in order to access feed stored above the livestock storage area 62 for filling troughs 68a and 68b. In one embodiment, the widening portion 108 can be angled relative to the vertical partition 76. It should be appreciated the widening portion 108 can be omitted and the vertical partition 76 can be extended slightly further than illustrated. In another embodiment, the widening portion 108 can be a gate hinged to the feed partition 66 or hinged to an additional structure provided in the vicinity of the widening portion 108.

Now referring primarily to the embodiment illustrated in FIG. 2C, a first water bowl 80a and a second water bowl 80b are located on opposite sides of the first trough 68a and are accessible to livestock when occupying the first compartment 112 of the livestock storage area 62. Third and fourth water bowls 80c and 80d can be similarly located on opposite ends of the second trough 68b accessible to animals in the second compartment 114 of the livestock storage area 62. A fifth water bowl 80e can be located in an opening in the enclosure gate 110 allowing access from both the first and the second compartments. Other configurations of water bowls are contemplated for use with embodiments herein. For example, the second and third water bowls could be replaced with a single water bowl accessible from each of the first compartment and the second compartment. Similarly, additional water bowls are contemplated herein, such as six, eight, ten, or more water bowls.
The water bowls can be supplied in series and can be fitted with brass or metal connectors, although the invention is not so limited.

FIG. 2D illustrates a perspective view of the shipping container 10, in certain respects providing a more detailed view of a particular embodiment of the feed partition 66, however, the feed partition 66 can be constructed in any number of configurations. In one aspect, the feed partition 66 provides sufficient separation between the livestock storage area 62 and the feed storage area 64 with sufficient access to the trough 68 from the livestock storage area 62. The illustrated embodiment provides an area for the livestock separated from an area for the trough 68. The feed partition 66 creating these areas within the shipping container can be constructed of tubular metal such as steel or aluminum in a pen like configuration within the shipping container 10; however the invention is not so limited, and other materials and configurations can be utilized. Crossbeam 78 can be omitted, as shown in figure, FIG. 2D, but it should be appreciated that any number of crossbeams can be used to both reinforce the feed partition 66 and limit the access of livestock into other compartments.

Front wall 16 can have a personnel opening 38 (as shown in FIG. 1) to the exterior of the shipping container 10. This personnel opening can serve as an entrance for attendants responsible for filling the trough 68 by providing direct access to the feed storage area 64. Vertical partition 76 can provide support for horizontal partition 74. The horizontal partition 74 can comprise a metal or wood framework in combination with a surface such as plywood. It should be appreciated, while the horizontal partition 74 can extend all the way to the vertical partition 76, the horizontal partition 74 may also be constructed with cut away sections. The cut away sections can be located directly over the livestock storage area 62, so bedding can be stored on the horizontal partition 74 and subsequently dropped directly into the livestock storage area 62. Plywood, or another flat solid material, can prevent livestock from accessing the feed stored overhead.

Separating livestock in the livestock storage area 62 can help ensure the even distribution of feed, as well at the even distribution of weight within the shipping container 10. Depending on the size of the shipping container 10 and on the type of livestock, multiple gates can be included. The enclosure gate 110 provides a means for ensuring a
more even distribution of livestock for feeding purposes and for weight distribution. In particular, some embodiments described herein relate to feeding livestock measured portions in order to reduce the amount of wasted produced during shipment. As such, an uneven distribution of livestock within a single container may result in some livestock receiving less nourishment than intended. Additionally, given that livestock, such as cattle, can easily weigh over a thousand pounds apiece, and that a shipping container can hold roughly sixteen cattle, the weight distribution on a shipping container can easily be thrown off balance by the movement of a few animals. The uneven, or unpredictable, distribution of weight can be problematic for loading these shipping containers onto the shipping vessels depending on the type of mechanism used for lifting. Even a single enclosure gate 110 goes a long way to balance the weight of the livestock by ensuring that each half of the container has roughly the same weight of livestock.

In one non-limiting embodiment each animal is provided with its own individual gated area. In another embodiment, side doors can be provided in addition to the cargo gate 24. Side doors can provide a means for loading individual livestock into the shipping container 10. In an alternative embodiment livestock can be individually partitioned in a shipping container 10 having multiple side doors. By way of an example, each animal could have an individual partitioned space with its own gate to the exterior of the shipping container 10. The enclosure gate 110 can also be used to separate sick livestock to provide them with more space or easier access for treatment, but also provides a health benefit to the remaining healthy animals.

FIG. 3 illustrates a more detailed isometric view of an embodiment whereby similar elements previously described are illustrated with the same reference numbers. In this isometric view, the horizontal partition 74 is broken away in order to provide a better view of the feed partition 66 including the pieces making up the vertical partition 76. The vertical partition 66 can generally be seen within a shipping container 60, separating a livestock storage area 62 from a feed storage area 64. It should be appreciated that the vertical partition is illustrated along a vertical axis, but that the vertical partition 76 can be tilted between about 1 and 12 degrees off the vertical axis, in order to provide more floor space to livestock and more room for retrieving feed above the feed partition 66.
A first trough 68a and second trough 68b can be seen along with a first, second, third, and forth nose operated water bowl. The vertical partition 76 can more clearly be seen as a collection of vertical spaced members 79 and crossbeams 78. The crossbeams 78 are specifically illustrated as a first crossbeam 78a, a second crossbeam 78b, and a third crossbeam 78c, a fourth crossbeam 78d, and a fifth crossbeam 78e. In one embodiment, the feed partition 66 can be viewed as an upper portion 84 from about the third crossbeam 78c upwards and as a lower portion 86 from about the third crossbar 78c downward. In one non-limiting embodiment, the distinction between the upper portion 84 and the lower portion 86 can be either in about the center of the vertical partition 76, or can be at the height of the catwalk 70.

As previously described, each of the vertical spaced members 79 can provide sufficient spacing for livestock to access the first trough 68a and the second trough 86b in the substantially vertical sidewall space 63 of the feed storage area 64. FIG. 3 further illustrates lower portion 86 having the third crossbeam 78c and the fourth crossbeam 78d sufficiently vertically spaced to enable livestock, such as bovine, to access each of the troughs 68 in a feed space opening 81. The lower portion 86 can be configured in any number of ways so long as feed space openings 81 exist in the vertical partition 76 through which livestock can access the troughs 68. The feed space openings 81 can be coordinated in size and spacing according to the livestock being transported helping to ensure measured portions of feed can be accessed by livestock. In one embodiment, the vertical spaced members 79 can be slidably adjustable within the feed partition 66 and lockable into different configurations.

The upper portion 84 provides smaller spacing between the first crossbeam 78a and the second crossbeam 78b as compared to the third crossbeam 78c and the fourth crossbeam 78d and can serve to protect personnel, such as attendants, on the catwalk 70 from livestock in the livestock storage area 62. It should be appreciated that other configurations are contemplated for use herein. For example, the first crossbeam 78a and the second crossbeam 78b, as well as the vertical spaced members 79 in the upper portion 84 can be replaced with diagonal members, just vertical members, just horizontal members, or any combination thereof. The upper portion 84 could be replaced with a solid material, such as
plywood or sheet metal, or with a mesh or chain link fence, or an appropriate combination thereof. In another embodiment, regardless of the material used, the upper portion 84 can contain additional openings which can allow attendants to access the livestock storage area 62 from selected locations on the catwalk 70.

In an alternative non-limiting embodiment the feed partition 66 can be provided with a mechanical or automated means for actuating feed 72, such as pellets or gain, from the substantially horizontal overhead space 61 of the feed storage area 64 into the trough 68 in the substantially vertical sidewall space 63 of the feed storage area 64. As one example, a mechanical lever can be operatively connected to a mechanism for gravity feeding the trough 68 from the substantially horizontal overhead space 61, or for releasing feed 72 from the substantially horizontal overhead space 61. The mechanism can include an auger along the length of the substantially horizontal overhead space 61, wherein the auger can be dimensioned to pick up feed or pellets as it turns and drop the feed or pellets from the substantially horizontal overhead space 61 into the feed trough below. The auger can have a handle at one end for actuation.

In another non-limiting embodiment, the first 20 or the second 22 sideward of the shipping container 10 can include a plurality of doors. Additional internal partitions can be included on the interior of the container corresponding to these doors for creating a plurality of smaller, or even individual, livestock storage spaces. Such an embodiment would permit loading and unloading containers by individual animal, or by small groups of animals, and may be desirable if more than one type on animal is loaded on one container, or for shipping containers to be loaded or unloaded at more than one location.

Other embodiments can relate to increasing the efficiency of the shipment process. For example, in one embodiment, the livestock can be shipped with milking machines. In another embodiment, the process of identifying the livestock can be improved by the inclusion of radio frequency identification tags ("RFID tag"), thereby reducing down time at ports or other locations where livestock must be inventoried by allowing animals to be identified from the exterior of the shipping container. RFID tags used in conjunction with a detector and software can provide information about livestock thereby speeding up, loading times, unloading times, and any checks that might be run at various stages of the trip.

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FIG. 4A illustrates an alternative embodiment where feed in a shipping container 10, such as hay or compressed hay 122, can be stored along an interior wall 124, similar to the vertical partition previously described, in a sidewall storage space 130. Like the vertical partition, the interior wall 124 can have a feed space opening 126 towards the bottom permitting livestock to feed from hay gravity fed to that area. In one embodiment the entire interior wall 124 can provide openings for livestock to feed on the hay or compressed hay. For example, the interior wall 124 can be constructed from a ladder like configuration of metallic members providing access to the sidewall storage space 130 along the entire length of the interior wall 124. The members can be spaced to permit livestock to access the feed and a wide variety of materials can be in their construction. In one embodiment the interior wall 124 can be constructed from a relatively solid material, the hay can be locked into position allowing the periodic release of measured portions of hay into the feed space opening 126.

In a similar embodiment, a first stop can be formed in the interior sidewall space to prevent the gravity feeding of pellets, grain or hay into the area accessible by livestock. A second stop can be configured for releasing a measured amount of feed for release by the first stop. In one non-limiting embodiment with pelletized feed, the stops can be valves for releasing measured amounts of feed. The valves can be mechanically or remotely actuated.

FIG. 4B illustrates an embodiment with horizontal component, similar to the horizontal partition, in the form of a slanted ceiling 128 for storing a larger volume of feed such as hay, similar to a horizontal partition discussed with other embodiments. The slope of the ceiling can be adjusted so gravity urges hay or compressed hay 122 towards the storage area as the accessible hay is consumed. A further embodiment is envisioned where feed such as hay can be stored on the floor.

FIGS. 5A and B illustrate a non-limiting alternative embodiment of the shipping container 10 comprising a hopper 150. It should be appreciated the hopper 150 can be located with a trough 68 on the exterior of a feed partition 66, as illustrated in FIG 2A-C. The primary difference in the embodiment of FIG 5 is the inclusion of pelletized feed or grain in a hopper 150 for gravity feeding into the trough 68. The release of feed from the hopper 150 can be regulated by a stopper 152 in the form of an adjustable cover. The
stopper 152 can include a plurality of openings which can align with openings in the hopper 150 for releasing feed into the trough. The stopper 152 can be manually manipulated into an open position for releasing feed, or can be actuated by a timer. In one embodiment, the hopper 150 can be fitted with a servo motor on a timer for releasing measured amounts of feed at regular intervals. This embodiment can provide for a more automated method of feeding livestock during a long shipment. FIG. 5B illustrates but one embodiment of a hopper 150 for use with the shipping containers, and it should be appreciated other hopper designs and configurations are contemplated for use in conjunction with the other features of the shipping containers presented herein.

In one non-limiting embodiment, the hopper 150 further comprises a timing mechanism for releasing predetermined amounts of feed at predetermined intervals. For example, a timer and an actuating arm can be used wherein the actuating arm is adjusted at predetermined intervals for moving the adjustable cover in order to allow feed to pass through the outlet of the feed holding container.

Certain inventive concepts contained herein relate to the sharing of common resources between more than one shipping container, and particularly more than one shipping container for shipping livestock. For example, a common source of drinking water and/or electricity can be provided to an array of livestock shipping containers. In one embodiment, the common resource comprises fresh drinking water delivered to a plurality of shipping containers through a water delivery system. In order to achieve this system, shipping containers can be configured into an array or multiple arrays, whereby a pressurized water source supplies each of the connected shipping containers within the array or multiple arrays. Such a system can include a water source connected to a pressure source for pressurizing the water in a delivery line to the shipping containers.

The water source of the water delivery system can include a modified ballast tank of the shipping vessel or other water tanks brought aboard the shipping vessel such as liquid shipping container, a container housing a plastic tank, or a container housing a bladder. In order for the ballast tank of a shipping vessel to be used as a source of drinking water, the ballast tank must be pressure washed to remove contaminants and microorganisms present in the previous ballast water. Optionally, the interior of the ballast tank can be coated or
painted in order to further maintain the purity of fresh drinking water. New ballast water can then be added at a port in the form of fresh water to any embodiment of the water tank. In another aspect plastic tanks or bladders can be loaded in shipping containers; however such tanks and bladders should be secured within shipping containers. In yet another aspect, liquid shipping containers can be filled with water and loaded along with the other shipping containers.

The pressure source of the water delivery system can be a ballast pump in communication with the ballast tank for pumping the water to either a deck, to individual shipping containers, or to an intermediate water tank. An intermediate water tank can be stored on the same level as, or above, the shipping containers for supplying the shipping containers with water or for circulating water through the shipping containers. The intermediate water tank can be stored within a shipping container, or may comprise a bladder stored within a shipping container. In another embodiment, the pressure source can comprises a circulation pump in communication with a liquid shipping container, or another water tank housed in a shipping container. In one embodiment, where the pump is electrically powered, a second back up source of power can be provided so as to keep the pump active in the event the primary source of power is lost during shipment. In another embodiment, a second pump can be provided for redundancy incase the first pump is lost or damaged during transport.

A delivery line can then supply water to the at least two shipping containers in the array of shipping containers. The delivery line can run to the at least two shipping containers in parallel or in series. The delivery line can connect directly to piping or hoses within shipping containers or can be connected through supply lines with a shut off valves. The delivery line can include a single delivery line for supplying a plurality of shipping containers, or the delivery line can comprise a number of lines which each supply single shipping containers or groups of shipping containers. The delivery lines can include, or be branched into, one or more supply lines. The supply lines can each include shut off valves allowing for water to be cut off to one particular shipping container in the event of a leak, while the water supply continues uninterrupted to the remaining shipping containers. The delivery lines can be constructed from cross linked polyethylene tubing, polypropylene, or
from other corrosion resistant polymers and polymers with a relatively low glass transition temperature so they retain their flexibility at or below freezing temperatures. Other corrosion resistant and freeze resistant materials known for circulating water are also contemplated for use herein.

In one aspect the delivery lines can connect to individual shipping containers through supply lines, which can either be connected the shipping container in series or in parallel. Each of the supply lines can be connected through a shut off valve. In this way, shipping containers presenting leaks or other problems can individually be shut off while the leaks are fixed. The supply lines can be connected to individual shipping containers or can supply groups of shipping containers, such as rows of shipping containers.

Turning now to FIG. 6, which is a schematic representation that illustrates an embodiment of a water delivery system on board a shipping vessel 200. The shipping vessel 200 is illustrated with a hull 202 and a ballast tank 204 filled partially with ballast water 208. In this particular embodiment, the ballast tank 204 comprises the water source. In order to use ballast water 208 as suitable drinking water, the ballast tanks 204 must be cleaned and filled with fresh water. Typically, ballast tanks are filled with seawater when in port and this will not provide suitable drinking water. The pressure source is illustrated as a ballast pump 224 connected to a water line 210 for pumping ballast water 208 to the surface 206 of the shipping vessel 200. Once at the surface 206, ballast water 208 can be pumped to a first shipping container 212 having an intermediate water tank 222. It should be appreciated in other embodiments; the intermediate tank can comprise the water source and can be loaded onto the shipping vessel filled with a quantity of water. From there, a delivery line 226 delivers water to each of a second shipping container 214, a third shipping container 216 and a fourth shipping container 218 and a fifth shipping container 220. It should be appreciated that each of the second container 214 and subsequent containers can be livestock containers, like those previously described.

FIG. 7A illustrates one arrangement of shipping containers in an array of columns and rows whereby the ballast pump 224 can supply a plurality of supply lines 230 in parallel through a single delivery line 226, including a first shipping container 212, which may include a water tank or a water bladder. Optionally, a return line 232 can connect back to
the first shipping container 212 creating a closed circuit. The closed circuit created by the return line 232 allows water to be continuously circulated through the delivery line 226. Continuously circulating water in this fashion provides an advantage by helping to prevent water from freezing and damaging the water lines.

FIG. 7B illustrates an embodiment where a manifold 228 enables multiple delivery lines 226 from the first shipping container 212, one for each illustrated row of shipping containers. Each delivery line 226 still has parallel supply lines 230 for each shipping container in the respective rows. It should be appreciated the number of shipping containers in a row is not limited to four, as illustrated, but will be a function of the space available on a shipping vessel for shipping containers. Similarly, the numbers of rows are not limited to three, but any number of rows suitable for shipping can be employed. A manifold 228, or a series of manifolds, can be used to divide a delivery line 226 into groups of parallel delivery lines. In one aspect, manifold 228 can be used in place of, or in conjunction with, the intermediate water storage tank 222. In one aspect, the first pump can provide pressurized water from the water source, such as the ballast tank or liquid shipping container, to the manifold which can subsequently delivery water through a plurality of delivery lines to individual shipping containers or groups of shipping containers. In another aspect, water can be pumped to the intermediate water tank then through the manifold for splitting into a plurality of delivery lines.

FIG. 7C illustrates an alternative embodiment, where each of the each shipping containers, including the first shipping container 212, can be supplied in series with a single delivery line 226. This embodiment can include a return line for continuously circulating pressurized water in the delivery line and a pump for supplying water or for continuously circulating water.

FIG. 8A relates to a schematic representation of the water delivery system in accordance with particular embodiments of the present invention. The ballast tank 312 can be filled with fresh water prior to shipment. The ballast tank 312 can include the ballast tank of a shipping vessel as well as a liquid shipping container, such as those used for shipping liquids. In order to ensure the fresh water is not contaminated, previous water can be drained from the ballast tank 312 and the interior of the tank can be pressure washed. In
some embodiments, the interior of the ballast tank can be painted or repainted after a certain number of uses or at specified intervals of time. Fresh water can be drawn from the ballast tank 312 through a ballast pump 318. A filter or a filtration system 320 can be connected to the ballast tank 312, to help ensure metals, sediment, debris, microorganisms, and other potential health threats are removed from the drinking water. The water filtration system 320 can comprise a single stage, or multiple stage system which can be selected from: carbon filters, reverse osmosis, a distiller, an alkaline water machine, ultraviolet light, and other known water filters and filtering devices. It should be appreciated that in an alternative embodiment, such a system can be located within, or in line with, each shipping container to which water is supplied. This can be done in addition to, or in lieu of, illustrated filtration system 320.

After passing through the filtration system 320, water can be passed to the intermediate tank 310. The intermediate tank 310 can be contained within a standard shipping container. Such a tank can include a rigid plastic water tank, or a bladder. The water tank can hold thousands to tens of thousands of gallons of water. A bladder can be a flexible, expandable pouch which remains flat until filled with water. Each bladder or the rigid plastic container can be secured within the shipping container to prevent movement. Rocking of the shipping vessel at sea can put a great deal of stress on the rigid plastic container and the forces generated by water sloshing around within a shipping container can cause damage to the shipping container so care should be taken to secure these shipping containers. The intermediate water tank 310 can also be shipping container designed for liquids.

It should further be appreciated, that intermediate tank 310 can be loaded onto the shipping vessel filled with drinking water thereby bypassing the need for the ballast pump and for storing drinking water in the ballast tank. In one embodiment, shipping containers with plastic tanks or bladders are loaded onto the shipping vessel filled with drinking water. Similarly, in another aspect, liquid shipping containers can be cleaned and filled with drinking water for supplying drinking water to each of the shipping containers housing livestock. The number of tanks or containers will vary based upon the number and size of livestock, the weather conditions, and the length of the voyage. Those of ordinary skill in
the art can appreciate livestock, cattle specifically, consume roughly between about 5-20 gallons of water per animal per day.

The ballast pump 318 can be run continuously or can be automatically or manually activated based on the water level of the intermediate tank 310. Circulation pump 316 can draw water out of the intermediate tank 310 for supplying one or more shipping containers 314. The one or more shipping containers 314 are represented as single block but should be understood to include multiple shipping containers supplied in series by a single pressurized line, multiple shipping containers supplied in parallel by multiple pressurized lines, or multiple shipping containers supplied by a combination of lines in parallel and in series. Regardless of the exact configuration with which shipping containers are supplied, a return line 322 can connect back to the intermediate tank 310. The return line 322 allows water to be continuously run through the pressurized lines.

FIG. 8B illustrates an alternative embodiment where similar parts receive the same numbers as in FIG. 8A. In FIG. 8B, a ballast pump 318 draws drinking water from the ballast tank 312 through a filtration system and directly into delivery line 326 and to a tank 330 which can be contained in a shipping container with livestock. Delivery line 326 can supply a plurality of tanks 330 within a plurality of shipping containers in series. Individual tanks can them be filled by running the ballast pump 318 and opening a valve at the desired tank 330. FIG. 8B illustrates an alternative embodiment where a manifold 328 splits the delivery line 326 into at least a second delivery line 336 and a third delivery line 338. The second delivery line 336 is illustrated supplying a second tank 332, which should be understood to include a second plurality of tanks supplied in series or in parallel. Similarly, a third delivery line 338 is illustrated supplying a third tank 334, which should be understood to include a single tank or a plurality of tanks supplied in series or in parallel.

It should be appreciated the manifold 328 can have more than two extra branches. For example, the manifold 328 can be used to supply as many as sixteen delivery lines. Further, additional manifolds can be used in order to further split the water delivery lines dependent upon the arrangement of contains on a shipping vessel, as many manifolds can be used as needed to supply each shipping container with its own tank.
FIG. 8C illustrates an embodiment where drinking water is not supplied from a ballast tank, but is supplied from a liquid shipping container 340, which can be loaded onto the vessel filled with drinking water. Liquid shipping containers 340 are available from a number of manufactures including WEW Westerwälter Eisenwerk GmbH, of Weitefeld Germany. Such a liquid shipping container 340 can be loaded onto the surface of a shipping vessel or in the hull of a shipping vessel storing a predetermined amount of drinking water. The number of liquid shipping containers 340 that might be used on a particular trip can depend upon the capacity of the liquid shipping containers, the duration of the trip, and the volume of water required by the livestock per day. It should be understood, the shipping containers 314 are a schematic representation of a plurality of shipping containers which can be configured as an array of shipping containers 314 supplied water in series, in parallel, or in some combination thereof. Multiple arrays of shipping containers can be placed on the deck or in the hull of a shipping vessel, and each array can include one or more liquid shipping containers 340.

In the illustrated embodiment, a circulation pump 316 directs water to the shipping containers 314. As previously described, the shipping containers 314 can be arranged in any number of configurations or arrays. Water can be supplied to smaller tanks within each shipping container or can be supplied to pressurized water lines connected to nose operated water bowls. Each of these embodiments can include a return line 322. In one embodiment, purification units, or filters, can be provided with the liquid shipping container 340, or in the water lines connecting the shipping containers 314 to the liquid shipping containers 340.

FIG. 9 illustrates an example of multiple shipping containers interconnected to share common resources, such as water and electricity. Container 400 can be a water container housing a water tank 402 and a water pump 404 for supplying water to the remaining shipping containers. By way of an example, water container 400 can be directly linked to a first container 406 through a pipe or a hose 408. Any suitable plumbing or piping known to those of ordinary skill in the art can also be used. The hose can further be heated with heating coils in order to prevent problems with water supply to the livestock. Pipes external to the shipping containers can be insulated by tape, a coating or sheath, as well as constructed from cross-linked polymers, such as cross linked polyethylene to prevent
freezing and associated disruptions to the water supply. In the alternative to a water tank, water can be supplied from the water ballast tank of the shipping vessel. This water must be processed or purified in order to remove salt, sediment, and microorganisms before being supplied to the livestock as drinking water.

It should be appreciated that water can also be stored internally with each shipping container. Water can be stored in a large tank, in a bladder, or in several smaller tanks. The amount of water in each tank should be sufficient for the number of livestock supplied by each tank and the length of the voyage. Those in the livestock industry can further appreciate the water needs of individual animals can vary with the weight of the livestock, as well as with the temperature and weather exposure of the livestock. Each of these factors should be considered when providing an external water source to the shipping containers, or internal water sources to the shipping containers.

A generator 414 can be located on top of the first shipping container 406 and can be connected at an electrical panel as previously described. In the alternative, the first shipping container 406 can be supplied power from a source on the shipping vessel. The power can be networked in series, in parallel, or in a combination thereof to each of the remaining shipping containers. In an alternative embodiment, power can be supplied from the shipping vessel, eliminating the need for the generator 414. In such an embodiment, the container 400 can be a utility container including each of the water tank 402, a transformer for stepping down power received from the shipping vessel, and pumps for circulating water from the water tank 402.

The second shipping container 410 can be located in horizontal relationship to the first shipping container 406, as illustrated in FIG. 9. The second shipping container 410 can be supplied with electricity by an electrical connection 418 to the first shipping container 406 and can be supplied with water from the first shipping container 406 through a waterline 416. The waterline 416 can be a pipe or hose constructed from a galvanized metal or a polymer or rubber. Additionally, the waterline can be configured with a heating means, such as a heating coil, or an insulating layer. In the alternative, the water can be heated in order to prevent the formation of ice. Alternatively, the second shipping container 410 can be supplied with water and electricity in parallel with the first shipping container 406.
A third shipping container 412 is illustrated in a vertical relationship to the second shipping container 410. In one aspect the third shipping container 412 should include a liquid tight seal beneath the absorbent bedding to prevent waste from leaking into the second shipping container 410. By way of a non-limiting example, a plastic layer can be placed under the absorbent bedding for the purpose retaining fluids. In the alternative, a drain pan can be implemented for the controlled draining of waste materials. The third shipping container 412 can be connected to the second shipping container 410 by a hose 420, and by an electrical connection 418, but can also be supplied in water and/or electricity in parallel with the first and the second shipping containers.

Each shipping container can include a number of electrical devices requiring a supply of electric power. These devices can include, but are not limited to internal lights, heating devices, cooling devices, and fans. While some cargo vessels can generate and provide power at 440 volts, most electrical devices may not be adapted for use with such a high voltage. Turning now to FIG. 10A, a schematic for supplying each of a plurality of shipping containers with electrical power is illustrated. An external power source 500, which can generate power, such as three phase 440 volt electrical currents, is depicted in communication with a transformer 502. The external power source 500 can include a power source located on the shipping vessel or generators brought onboard with the shipping containers. For example, the external power source 500 can be one selected from a gas powered generator, a solar powered generator, a hydrogen powered generated, or combinations thereof. This single transformer 502 can step the voltage down and can be used to supply multiple shipping containers, such as a first shipping container 504a, a second shipping container 504b, a third shipping container 504c, and a fourth shipping container 504d. The first shipping container 504a can be like the one depicted in FIG. 1 having a connection for a power supply at a control panel. The control panel can include fuses and switches and output lines for powering electrical devices within the shipping container such as lights 506a, a heating element 508a, a first fan 510a and a second fan 512a. The embodiment depicted in FIG. 10A illustrates each of the shipping containers being supplied in parallel from the transformer 502.
FIG. 10B illustrates an embodiment where each shipping container is supplied power in parallel directly from the generator 500. In this embodiment, the first shipping container 504a includes a first transformer 502a, while the second shipping container 504b includes a second transformer 502b, and the third 502c and fourth shipping containers 502d include third 502c and fourth transformers 502b, respectively. Each shipping container can include individual transformers for powering each electrical device in the respective shipping containers. In another embodiment, the configuration of FIG. 10A can be supplemented with second transformers in individual shipping containers. In such an embodiment, the first transformer can step down the power produced by the generator, and second transformers, located with each shipping container, can further step the power down, or step the power up, depending on the power requirements of the electrical devices within the shipping containers.

FIG. 10C illustrates another embodiment where the generator 500 communicates directly with a transformer 502, for stepping down the power. The transformer 502 then feeds each of the first shipping container 504a, second shipping container 504b, third shipping container 504c, and forth shipping container 504d in series.

Similarly, FIG. 10D illustrates a generator 500 connected in series with each of the shipping containers. Like the embodiment described in FIG. 10B, each shipping container can include a transformer for stepping down power delivered from the generator 500.

Regardless of the configuration used to supply power to the containers 504, or to the electrical devices in the containers 500, it may be desirable to have water tight seals at each electrical connection. It may further be desirable to use waterproof lines from the generator 500 or transformer 502 to the container 504 and from the containers to their respective electrical devices. Otherwise, these lines and connections may be at risk from exposure to the elements, such as rain and ocean water. The connections can be further reinforced, particularly those on the interior of a container, to prevent damage from livestock which can chew on, or play with, lines and connections. In the event electrical lines are run within a shipping container, they can be set as flush as possible with the interior surface of the shipping container to minimize contact with livestock. For example, some lines may be run
on the interior of the container for powering internal light sources. These connections can be waterproof, and the lights themselves can construct in a water resistant configuration.

FIGS. 11A-B illustrates a non-limiting embodiment of shipping container systems for stacking shipping containers carrying livestock including a spacer with a catwalk and railing. A first container 610 can be stacked on top of a spacer 614, which can be itself stacked on a second container 612. The spacer 614 can extend further than each of the containers providing a catwalk convenient to the personnel openings, and particularly the personnel opening of the first container 620. As one example, the spacer 614 can substantially match the length and width of the shipping container, except that it can extend outwards at a front portion. A major drawback to stacking shipping containers for livestock can be that an attendant must generally access each container in order to ensure livestock have access to food and water and to monitor the health of the livestock during shipment. Scaffolding and other ladders may not provide the sturdy support necessitated by the motion of a shipping vessel in combination with the potentially hazardous weather on the open sea.

The spacer 614 nested or mated with the top surface of the second container 612 and can further be secured by the weight of the first container 610 to ensure the catwalk provides a sturdy elevated surface. Rails 616 can provide some protection from falling, however, a safety harness may also be used with the disclosed embodiment to further reduce the potential injuries. The railing 616 can be provided with a left rail 626, a back rail 628 and a right rail 630 and generally outlines the catwalk portion of the spacer 614. Each portion of the railing 616 can be rigidly affixed to the spacer 614 by welding or other means, or each section of railing 616 can be removably attached to the spacer 614.

A ladder 618 can pass through the spacer 614 at an opening 624. The ladder 618 and opening 624 provide access to the catwalk portion of the spacer 614 for entry into the second container.

FIG. 11C illustrates a non-limiting embodiment having three groups of stacked containers with a common ladder 618. The first container 610 includes a spacer 614 with an opening 624 for a ladder, but only with the left railing 626 and the back railing 628. A bridge 632 can be provided to a second container 640 which has a spacer 644 illustrated with a railing 646 having only a back railing. The bridge 632 can be locked into place once
the containers and spacers are stacked into place. The bridge 632 can also include rails in order to help prevent falling injuries between the container stacks.

A second bridge 648 can connect the second container 640 to a third container 650, the third container 650 having a spacer 654 and a railing 656. The illustrated arrangement of railing and bridges provides a single entry for accessing the personnel openings of multiple containers on a second level of containers.

Standard openings or slots on each corner of the shipping container enable secured stacking and locking. However, stacking livestock shipping containers presents an additional hazard to personnel responsible for entering the shipping containers to feed livestock. A ladder can be provided adjacent to the personnel opening welded to the exterior of the shipping container. Harnesses and other additional precautions may be taken for accessing any such shipping container above the bottom level.

Livestock Shipping Methods

In one non-limiting embodiment the present invention relates to a method of transporting livestock. The method can include the step of separating a shipping container into a livestock storage area and feed storage area. The feed storage area can comprise a continuous opening formed from a substantially horizontal overhead space and a substantially vertical sidewall space. Feed can then be loaded in the feed storage area for storage, and more specifically can be stored in the substantially horizontal overhead space. Livestock can be loaded into the livestock storage area for transport. Separation can be maintained between the livestock and feed stored in the substantially horizontal overhead space. A trough can be provided in the substantially vertical sidewall space of the feed storage space, accessible by livestock in the livestock storage space. Periodically, measured amounts of feed can be released from the inaccessible position in the substantially horizontal overhead space to the accessible location in the trough. The feed can be released in roughly equal portions throughout the duration of a trip. The feed portions can be measured and adjusted for consuming the majority of feed during a trip. In one non-limiting embodiment the feed can be sufficient for a one week trip. In another embodiment feed can be supplied
for a two week trip, and in yet another embodiment feed can be provided for three weeks of transport, or even up to a 45 day trip.

For the purpose of periodically releasing measured amounts of feed, feed pellets can be stored separately from the livestock for periodic release in measured amounts. The feed can be released manually, by an automated means, or can be actuated with a device providing a mechanical advantage. As one example, feed can be stored in a side wall or above the livestock and can be released. Additionally, feed can be released from the wall or from above the livestock by the actuation of a mechanical means, such as a lever or a crank, adapted for releasing feed. The feed itself, in one embodiment, can be pelletized feed fortified with nutrients and/or antibiotics. For this embodiment, any of the previously described shipping containers can be used, even those adapted for the serial delivery of water and electricity.

In another non-limiting embodiment, the present invention relates to an improved method of transporting livestock. The method can include the first step of loading livestock into a plurality of shipping containers at a first destination. The first destination, in one embodiment, can be a quarantine location; however, ports and other destinations are envisioned with embodiments of this method. The shipping containers can then be loaded onto ground transportation vessels and taken to an intermediate destination, such as a port. At the intermediate destination the shipping containers can be transferred to a shipping vessel. In one embodiment, the shipping containers can be unloaded from the ground transport and placed on a dock to await lifting onto a shipping vessel, while in another embodiment the shipping containers can be lifted directly onto the shipping vessels. Once loaded onto the shipping vessel, the shipping containers can be carried to the second destination.

The shipping vessel can be a small vessel, a large vessel, a vessel designated solely for shipping livestock, or a vessel carrying bulk goods in addition to livestock. Once the shipping date is set, the livestock can be quarantined at an offsite location in accordance with any local or international livestock shipping requirements. The quarantine can begin the required number of days before the shipment date. Optionally, female animals can be cycled with hormones and other treatments prior to the quarantine, for artificial
insemination. Depending on the intended purpose of the livestock at their destination, the
cycled females can be inseminated with conventional sperm, or with sex sorted sperm. For
example, if the livestock comprise dairy cattle, they can be inseminated with sex sorted
sperm for the purpose of producing female offspring. In another example, the female
5 livestock can be inseminated with sex sorted sperm in order to produce male offspring. The
insemination can be timed such that the livestock have a low chance of giving birth during
shipment. Instead, the insemination can be timed so that the livestock produce their
offspring after they have arrived at their final destination. It should be appreciated for the
shipment of impregnated livestock, particularly heifers gestating embryos, temperatures and
10 conditions become more relevant to the health of the livestock and potential offspring.

Livestock can be loaded into specialized shipping containers at the quarantine area,
which are subsequently loaded onto trucks and taken to the departure port for the shipping
vessel. In one embodiment, the shipping containers can be lifted directly from the trucks
onto the shipping vessel. The lifting of the shipping containers can be achieved by either a
15 crane on the shipping vessel or by a crane on land. In one aspect, the step of loading the
shipping containers onto the shipping vessel can include, sequentially driving the ground
transports up to the loading area for the shipping vessel and individually lifting the shipping
containers directly off each sequential ground transport for placement on the deck of the
shipping vessel or in the hull of the shipping vessel. The shipping container can be loaded
20 onto the shipping vessel in at least one row of two to eighty containers. The containers can
be spaced about twelve inches apart in one embodiment, or about six inches apart in another
embodiment.

In another non-limiting embodiment the containers can be evenly loaded with
livestock in order to reduce potential problems loading the containers onto the shipping
25 vessel. Proportional numbers of livestock can be loaded into proportional sections of the
shipping containers sequentially. For example, one half of the livestock can be stored in the
back half of the shipping container, and then the second one half can be loaded into the front
half of the container.

Another aspect of the current invention relates to a method of transporting livestock
30 over long distances or long periods of time. The method can begin by providing at least one
modified shipping container. The modified shipping container can be modified to have ventilation openings, where the ventilation openings can be reinforced. A portion of the shipping container, or the entire bottom surface of the shipping container, can be sealed for preventing liquid and solid waste from escaping the shipping container. Because livestock are shipped among other dry goods, relying on the same loading equipment and dock space, it may be favorable that the shipping containers themselves do not impact the dock space or the shipping vessel space. The shipping containers can then be further modified for providing airflow. Livestock can then be loaded onto the modified shipping container, and the loaded shipping container can then be loaded onto a shipping vessel. These modifications can include a gate, and connections for receiving a supply of water and electric power.

In one embodiment the livestock can be loaded by the process of first categorizing livestock by weight. The area required by livestock in each category of livestock can then be determined. The capacity of the shipping containers for each livestock category can then be determined based on the requirements of each livestock category. Livestock from a first category can then be loaded into a first shipping container, or a first group of shipping containers, not exceeding the determined capacity for each shipping container. Subsequent categories of livestock can then be loaded into subsequent shipping containers, or groups of shipping containers. Each of the shipping containers can then be loaded on a shipping vessel and shipped to a destination location. The shipping containers can be unloaded from the shipping vessel at the destination location, where the shipping containers can either be unloaded, or trucked to a final destination.

In one non-limiting embodiment, the shipping containers can each provide a source of food and water sufficient for each animal throughout the trip. The volume of food and water in each shipping container per animal can depend on the category of livestock in each shipping container.

In one non-limiting embodiment, an additional category can exist for livestock which have been artificially inseminated. Livestock categorized as having been artificially inseminated before transport can be provided with shipping containers having circulation fans and access to water from anywhere in the shipping container. Additionally, shipping
containers for this category of livestock can be provided with additional space in the event calves are birthed in transit.

One non-limiting embodiment relates to a method of transporting livestock where a shipping container is configured for shipping livestock, livestock can be loaded into the shipping container, and the shipping container can be loaded onto a transport, or a vessel, which was not designed to carry livestock. The vessel can be a boat, plane, train, trailer, truck, or the like.

In another non-limiting embodiment the livestock can further be categorized by their health status. The health status of animals for this purpose can be understood as the absence or presence of any condition requiring veterinary attention, or the absence or presence of any contagious conditions. In this embodiment, those livestock categorized as a negative health, which can be those animals which require veterinary attention and/or those with contagious conditions can be isolated from the remaining healthy livestock in order to reduce the spread of illness and provide easier access to livestock requiring attention.

In one non-limiting embodiment the current invention relates to a method of doing business. The method of doing business can begin with the step of booking a shipping vessel to a desired destination, where the shipping vessel also contains bulk goods. Shipping containers can then be adapted for shipping livestock alongside the bulk goods, such as dry bulk goods, on the shipping vessel. The modified livestock shipping containers can be supplied with water and electricity on the shipping vessel.

In this non-limiting embodiment an attendant can be sent on the shipping vessel along with the livestock shipping containers in order to evaluate the health of the livestock being shipped, as well as, ensuring the water and electricity supplied to each shipping container is not interrupted.

In one non-limiting embodiment, the bulk goods reduce the costs of shipping each container. The livestock shipping containers can cost less than 1%, 5%, 10%, 20%, 50%, 80%, or 85% the total cost of the freight on the shipping vessel.
The shipping containers can include animals of the same species, animals that have been artificially inseminated, or even animals that have been artificially inseminated with sex sorted sperm, particularly artificially inseminated heifers.

In one non-limiting embodiment, the livestock shipping containers can be loaded directly from trucks onto the shipping vessel, or the shipping containers can be loaded directly from the shipping vessel to trucks during unloading.

In one aspect the present invention relates to a method of shipping livestock. The method can begin by providing a plurality of shipping containers, then modifying a plurality of shipping containers for the shipment of livestock. The modified shipping containers can be loaded with an appropriate amount of feed. The amount of feed can be determined by the length of the voyage, the number of livestock, (e.g. cattle) in each shipping container, as well as the size and age of the livestock. The feed can be loaded into a feeder or can be stored in a manner previously described. The method can include the step of lining each of the shipping containers into one or more rows near a shipping vessel. Livestock can then be led out of a first trailer and into a first shipping container through the cargo gate of the shipping container. In one non-limiting embodiment, the livestock and be herded single file into the shipping containers. An internal gate, or an enclosure gate, of the shipping container can be closed with the desired number of animals inside. For example, the internal gate can be located in roughly the middle of the shipping container and can be closed when half of the desired livestock have entered the back half of the shipping container. The remaining livestock can then be led into the front half of the shipping container. Once the desired number of animals is loaded into the front half of the shipping container, the loading doors can be closed. After the first shipping container is full, remaining livestock can be led from the trailer to an adjacent second shipping container.

A temporary partition can be provided, such as a gate for keeping livestock in place once loaded into a shipping container. The temporary gate can be slid into place along the length of the interior of the shipping container to prevent livestock from attempting to move back out of a shipping container. The temporary partition may be particularly useful in the event of delays in unloading livestock from subsequent trailers.
Each shipping container loaded with their respective animals can be lifted from land onto a shipping vessel. In one embodiment, the weight distribution of the livestock is kept relatively even within each shipping container.

In one non-limiting embodiment, a method of shipping livestock can begin by modifying a plurality of shipping containers for the shipment of livestock. The modified shipping containers can then be loaded with an appropriate amount of feed. The amount of feed can be determined by the length of the voyage, the number of cattle in each shipping container, as well as the size and age of the livestock. The feed can be loaded into a feeder or can be stored in a manner previously described. Next a plurality of livestock can then be loaded onto the shipping container. Each of the livestock and the feed can be loaded into separated portions of the shipping container, and the separation can be maintained between the stored feed and livestock. Once the feed and the livestock are in a shipping container, the shipping container can be loaded onto the shipping vessel, and then each of the shipping containers can be connected to both a supply of water and to a supply of electrical power.

Then the shipping vessel can depart on its voyage to its destination location. During and throughout the voyage, water can be circulated from a water source to each of the shipping containers, and feed can be periodically released from the feed storage area into an area accessible to the livestock.

In one non-limiting embodiment, the step of modifying the shipping container can include the steps of creating ventilation openings on the exterior of the shipping container, reinforcing the ventilation openings, and sealing the bottom of the shipping container in order to prevent or reduce leaking.

The amount of feed in each shipping container can be coordinated with the length of the shipment in addition to the portions and timing of feed which may be periodically released in order to ensure that the feed lasts for at least substantially the entire voyage.

One aspect relates to a method where the water can be warmed by being circulated through the shipping containers. The circulation alone of water may help to prevent freezing in the delivery and supply lines, but additionally provides the benefit of passing the water in the vicinity of livestock body heat. In the case of freezing temperatures this slightly warmer water can then return to the intermediate water tank.
The step of circulating the water can include pumping water out of a ballast tank, perhaps with a first pump, and then pumping water into each of the shipping containers loaded on the shipping vessel, perhaps with a second pump or a circulation pump.

One non-limiting embodiment relates to a method of circulating drinking water for livestock begins with the step of providing a shipping container and a ballast tank, then the step of emptying the ballast tank of a shipping vessel. The shipping vessel may have ballast tanks filled or half filled with water containing a variety of microorganisms. Once the ballast tank is empty, the ballast tank can be cleaned. Cleaning can be accomplished, for example, by pressure washing the interior surfaces of the ballast tank, then coating those same surfaces with, for example, a layer of paint. Once the interior of the tank has been cleaned, the ballast tanks can be filled with fresh water at a port or other appropriate location.

Throughout the course of a voyage, the water can be circulated from the ballast tank to an intermediate water tank for storage. From the intermediate tank, the drinking water can be circulated through each of the shipping containers where livestock can consume the water, for example at nose operated water bowls.

One non-limiting embodiment relates to a method for modifying a shipping container to for the shipment of livestock. The method can begin by acquiring a shipping container. Next at least one ventilation opening can be cut into one of the sides of the shipping container, and then the ventilation opening can be reinforced. As previously described, the ventilation opening can be reinforced by welding a frame constructed from metal plates, tubular metal, or the like into place. A feed partition can be installed on the interior of the container adjacent to one of the sidewalls and can be constructed with a fabricated vertical partition and a horizontal partition forming an enclosure. At least one trough and at least one water bowl can be installed adjacent to the feed partition and remain outside of the enclosure formed by the feed partition.

The shipping container can be further modified to receive water and electrical power to for connecting the water supply and electrical power supply to subsequent shipping containers.
In one non-limiting embodiment, the shipping container can be further modified by sealing the bottom of the container from leaking. In another embodiment, the shipping container can be further modified by including at least one fan to generate airflow through the container.

As can be easily understood from the foregoing, the basic concepts of the present invention may be embodied in a variety of ways. The invention involves numerous and varied embodiments of shipping container and methods of making and using the shipping container including, but not limited to, the best mode of the invention.

As such, the particular embodiments or elements of the invention disclosed by the description or shown in the figures or tables accompanying this application are not intended to be limiting, but rather exemplary of the numerous and varied embodiments generically encompassed by the invention or equivalents encompassed with respect to any particular element thereof. In addition, the specific description of a single embodiment or element of the invention may not explicitly describe all embodiments or elements possible; many alternatives are implicitly disclosed by the description and figures.

It should be understood that each element of an apparatus or each step of a method may be described by an apparatus term or method term. Such terms can be substituted where desired to make explicit the implicitly broad coverage to which this invention is entitled. As but one example, it should be understood that all steps of a method may be disclosed as an action, a means for taking that action, or as an element which causes that action. Similarly, each element of an apparatus may be disclosed as the physical element or the action which that physical element facilitates. As but one example, the disclosure of “container” should be understood to encompass disclosure of the act of “containing” -- whether explicitly discussed or not -- and, conversely, were there effectively disclosure of the act of “containing”, such a disclosure should be understood to encompass disclosure of a “container” and even a “means for containing.” Such alternative terms for each element or step are to be understood to be explicitly included in the description.

In addition, as to each term used it should be understood that unless its utilization in this application is inconsistent with such interpretation, common dictionary definitions should be understood to be included in the description for each term as contained in the

Moreover, for the purposes of the present invention, the term “a” or “an” entity refers to one or more of that entity; for example, “a container” refers to one or more of the containers. As such, the terms “a” or “an”, “one or more” and “at least one” can be used interchangeably herein.

All numeric values herein are assumed to be modified by the term “about”, whether or not explicitly indicated. For the purposes of the present invention, ranges may be expressed as from "about" one particular value to "about" another particular value. When such a range is expressed, another embodiment includes from the one particular value to the other particular value. The recitation of numerical ranges by endpoints includes all the numeric values subsumed within that range. A numerical range of one to five includes for example the numeric values 1, 1.5, 2, 2.75, 3, 3.80, 4, 5, and so forth. It will be further understood that the endpoints of each of the ranges are significant both in relation to the other endpoint, and independently of the other endpoint. When a value is expressed as an approximation by use of the antecedent "about," it will be understood that the particular value forms another embodiment.

Thus, the applicant(s) should be understood to claim at least: i) each of the shipping containers herein disclosed and described, ii) the related methods disclosed and described, iii) similar, equivalent, and even implicit variations of each of these devices and methods, iv) those alternative embodiments which accomplish each of the functions shown, disclosed, or described, v) those alternative designs and methods which accomplish each of the functions shown as are implicit to accomplish that which is disclosed and described, vi) each feature, component, and step shown as separate and independent inventions, vii) the applications enhanced by the various systems or components disclosed, viii) the resulting products produced by such systems or components, ix) methods and apparatuses substantially as described hereinbefore and with reference to any of the accompanying examples, x) the various combinations and permutations of each of the previous elements disclosed.
The background section of this patent application provides a statement of the field of endeavor to which the invention pertains. This section may also incorporate or contain paraphrasing of certain United States patents, patent applications, publications, or subject matter of the claimed invention useful in relating information, problems, or concerns about the state of technology to which the invention is drawn toward. It is not intended that any United States patent, patent application, publication, statement or other information cited or incorporated herein be interpreted, construed or deemed to be admitted as prior art with respect to the invention.

The claims set forth in this specification, if any, are hereby incorporated by reference as part of this description of the invention, and the applicant expressly reserves the right to use all of or a portion of such incorporated content of such claims as additional description to support any of or all of the claims or any element or component thereof, and the applicant further expressly reserves the right to move any portion of or all of the incorporated content of such claims or any element or component thereof from the description into the claims or vice versa as necessary to define the matter for which protection is sought by this application or by any subsequent application or continuation, division, or continuation-in-part application thereof, or to obtain any benefit of, reduction in fees pursuant to, or to comply with the patent laws, rules, or regulations of any country or treaty, and such content incorporated by reference shall survive during the entire pendency of this application including any subsequent continuation, division, or continuation-in-part application thereof or any reissue or extension thereon.

The claims set forth in this specification, if any, are further intended to describe the metes and bounds of a limited number of the preferred embodiments of the invention and are not to be construed as the broadest embodiment of the invention or a complete listing of embodiments of the invention that may be claimed. The applicant does not waive any right to develop further claims based upon the description set forth above as a part of any continuation, division, or continuation-in-part, or similar application.
VI. CLAIMS

1. A shipping container for transporting livestock comprising:
   a. a container having an interior storage space;
   b. a livestock storage area formed in the interior storage space;
   c. a feed storage area formed in the interior storage space and separated from the
      livestock storage area, the feed storage area comprising:
      i. a substantially horizontal overhead space formed in the interior
         storage space; and
      ii. a substantially vertical sidewall space formed in the interior storage
          space, wherein the substantially horizontal overhead space and the
          substantially vertical sidewall space form a continuous opening in the
          interior storage space.

2. The shipping container for transporting livestock according to claim 1 wherein at
   least a portion of the substantially vertical sidewall space remains accessible to
   livestock when stored in the livestock storage area, but the substantially horizontal
   overhead space remains inaccessible to livestock when stored in the livestock storage
   space.

3. The shipping container for transporting livestock according to claim 2 further
   comprising:
   a. at least one water bowl located in the substantially vertical sidewall space of
      the feed storage area;
   b. at least one trough located in the substantially vertical sidewall space of the
      feed storage area; and
   c. a feed partition dividing the shipping container into the feed storage area and
      the livestock storage area, wherein feed partition defines the boundaries of the
      feed storage area and the livestock storage area and wherein at least one water
      bowl and the at least one trough are accessible from the livestock storage area.
4. The shipping container for transporting livestock according to claim 3 wherein the feed partition comprises:
   a. a vertical partition having a feed space opening and defining, at least in part, the substantially vertical sidewall space; and
   b. a horizontal partition connected to the vertical partition wherein the horizontal partition defines, at least in part, the substantially horizontal overhead space.

5. The shipping container for transporting livestock according to claim 4 further comprising: a catwalk extended from the vertical partition.

6. The shipping container for transporting livestock according to claim 4 wherein the vertical partition comprises a series of vertical spaced members spaced to provide livestock access to the at least one trough and the at least one water bowl through the feed partition.

7. The shipping container for transporting livestock according to claim 6 wherein the vertical partition further comprises crossbeams spaced in conjunction with the vertical spaced members to form the feed space openings in the vertical partition.

8. The shipping container for transporting livestock according to claim 7 wherein the dimensions of the feed space openings are coordinated with the livestock being transported.

9. The shipping container for transporting livestock according to claim 4 wherein the horizontal partition comprises a substantially solid surface.

10. The shipping container for transporting livestock according to claim 9 wherein the substantially solid horizontal partition further comprises cut away portions.

11. The shipping container for transporting livestock according to claim 9 wherein the substantially solid horizontal partition forms a substantially horizontal overhead space.

12. The shipping container for transporting livestock according to claim 4 wherein the vertical partition is tilted between about 4 and 12 degrees off the vertical axis.

13. The shipping container for transporting livestock according to claim 12 wherein the vertical partition is tilted about 8 degrees off the vertical axis.
14. The shipping container for transporting livestock according to claim 5 wherein the vertical partition comprises an upper portion and a lower portion.

15. The shipping container for transporting livestock according to claim 15 wherein the lower portion comprises feed space openings, each spaced by vertical spaced members.

16. The shipping container for transporting livestock according to claim 15 wherein the upper portion comprises a portion of the vertical partition above the catwalk.

17. The shipping container for transporting livestock according to claim 16 wherein the upper portion comprises one selected from the group consisting of: an aluminum tubing framework, a solid wall, a mesh, and a chain link fence.

18. The shipping container for transporting livestock according to claim 5 wherein the catwalk comprises at least one elongate member.

19. The shipping container for transporting livestock according to claim 5 wherein the catwalk comprises planks having openings or slots.

20. The shipping container for transporting livestock according to claim 5 wherein the vertical partition separates the livestock storage area from an access walkway formed by the catwalk.

21. The shipping container for transporting livestock according to claim 5 wherein the catwalk provides access to feed in the feed storage area.

22. The shipping container for transporting livestock according to claim 3 wherein the water bowl comprises a nose operated water bowl and is connected to an external source of water.

23. The shipping container for transporting livestock according to claim 3 further comprising a plurality of sidewalls connecting a roof of the container to a bottom of the container enclosing an interior storage space of the shipping container, wherein the feed partition forms an enclosure within the interior shortage space dividing the interior storage space into the livestock storage area and the feed storage area.

24. The shipping container for transporting livestock according to claim 23 further comprising a catwalk attached extending from the feed partition in the feed storage
area, wherein the feed storage are further comprises an substantially horizontal overhead space above the feed partition.

25. The shipping container for transporting livestock according to claim 24 further comprising a personnel opening in one of the plurality of sidewalls providing access from the exterior of the shipping container to the feed storage area, the trough, and the catwalk.

26. The shipping container for transporting livestock according to claim 23 further comprising at least one ventilation opening in at least one of the plurality of sidewalls.

27. The shipping container for transporting livestock according to claim 26 further comprising external curtains and/or shutters on the at least one ventilation opening.

28. The shipping container for transporting livestock according to claim 23 further comprising a first ventilation fan and a second ventilation fan.

29. The shipping container for transporting livestock according to claim 23 further comprising an external electrical connection and/or internal fans.

30. The shipping container for transporting livestock according to claim 23 wherein the plurality of walls further comprise interior surfaces which are padded.

31. The shipping container for transporting livestock according to claim 3 further comprising pelleted feed coordinated with antibiotics, nutrients and/or antidiuretics for ensuring healthy livestock with reduced waste production.

32. The shipping container for transporting livestock according to claim 3 wherein the feed partition further comprises a vertical partition separating feed stored along one of the sidewalls from the livestock.

33. The shipping container for transporting livestock according to claim 3 wherein the feed partition includes a horizontal partition creating a substantially horizontal overhead space for storing feed.

34. The shipping container for transporting livestock according to claim 3 wherein the feed partition includes a vertical partition for separating the trough from the livestock storage area.
35. The shipping container for transporting livestock according to claim 34 wherein the vertical partition further comprises feed space openings providing access from the livestock storage area to the trough.

36. The shipping container for transporting livestock according to claim 1 wherein the shipping container further comprises an enclosure gate for dividing the livestock storage area.

37. The shipping container for transporting livestock according to claim 1 wherein the shipping container further comprises bedding on the floor of the interior storage space.

38. The shipping container for transporting livestock according to claim 37 wherein the bedding comprises one selected from the list consisting of saw dust, wood shavings, pine chips, rice chips, hay, straw, powder and combinations thereof.

39. The shipping container for transporting livestock according to claim 1 further comprising:
   a. a connection for receiving a water supply; and
   b. a connection for receiving a supply of electrical power.

40. The shipping container for transporting livestock according to claim 39 wherein the shipping container comprises a self sufficient unit for transporting livestock for between about 4 days and about 45 days.

41. The shipping container for transporting livestock according to claim 39 wherein the electrical supply is one selected from a group consisting of a gas powered generator, a solar powered generator, a hydrogen powered generator and combinations thereof.

42. The shipping container for transporting livestock according to claim 39 further comprising a milking machine for milking cows during transport.

43. The shipping container for transporting livestock according to claim 39 wherein pipes connected to the water supply are covered with padding.

44. The shipping container for transporting livestock according to claim 1 further comprising a traction surface.

45. The shipping container for transporting livestock according to claim 44 wherein the traction surface is one selected from the list consisting of: a rubber matting, a
metallic grid, a metallic mesh, a rubber grid, a corrugated surface, crossbars and combinations thereof.

46. The shipping container for transporting livestock according to claim 1 further comprising RFID tags for identifying livestock within each shipping container.

47. The shipping container for transporting livestock according to claim 1 further comprising:
   a. a roof, a bottom, and four sidewalls enclosing the interior storage space wherein a feed partition separates the interior storage space into a first portion and a second portion;
   b. a cargo gate located at one of the sidewalls; and
   c. a personnel opening to the second portion of the interior storage space formed in the cargo gate.

48. The shipping container for transporting livestock according to claim 47 further comprising at least one fan and a layer of bedding, wherein the at least one water bowl is connected to one of the sidewalls and wherein the at least one trough is connected to one of the sidewalls.

49. The shipping container for transporting livestock according to claim 47 further comprising an insulating layer comprising one selected from the group consisting of: a light reflective coating, insulating foam, an insulating film, and combinations thereof.

50. The shipping container for transporting livestock according to claim 47 wherein the feed partition includes at least one feed space opening providing limited access to the feed in the feed storage area from the livestock storage area.

51. The shipping container for transporting livestock according to claim 1 wherein feed is stored in a hopper.

52. The shipping container for transporting livestock according to claim 51 wherein the hopper includes a timer for releasing predetermined amounts of feed at predetermined times.
53. The shipping container for transporting livestock according to claim 1 wherein the shipping container comprises a control box for receiving power from an external source.

54. The shipping container for transporting livestock according to claim 53 wherein the control box comprises an electrical outlet for supplying power to a second shipping container.

55. The shipping container for transporting livestock according to claim 1 wherein the shipping container is configured with a water outlet for supplying water to a second shipping container.

56. The shipping container for transporting livestock according to claim 1 wherein the container having an interior storage space comprises a plurality of side walls connecting a roof to a bottom enclosing the interior storage space wherein at least one of the side walls includes a ventilation opening.

57. The shipping container for transporting livestock according to claim 56 further comprising:
   a. a feed trough located along one of the sidewalls; and
   b. a feed partition forming the livestock storage area within the interior shortage space, the feed partition comprising:
      i. a vertical partition separating the trough from the remaining interior of the enclosure; and/or
      ii. a horizontal partition connected to the vertical partition forming a substantially horizontal overhead space above the livestock storage area; and

58. The shipping container for transporting livestock according to claim 56 wherein hay or feed is stored in the substantially horizontal overhead space.

59. The shipping container for transporting livestock according to claim 58 further comprising a means for releasing feed from the substantially horizontal overhead space into the trough.
60. The shipping container for transporting livestock according to claim 59 where the means for releasing feed comprises a mechanical lever for a releasing mechanism for gravity feeding the trough from the substantially horizontal overhead space.

61. The shipping container for transporting livestock according to claim 59 further comprising and auger along the length of the substantially horizontal overhead space, wherein the auger is dimensioned to pick up feed or pellets as it turns and drop the feed or pellets from the substantially horizontal overhead space into the feed trough below.

62. The shipping container for transporting livestock according to claim 61 further comprising a handle at the end of the auger for actuating the auger.

63. The shipping container for transporting livestock according to claim 57 further comprising an absorbing bedding layer.

64. The shipping container for transporting livestock according to claim 57 further comprising a plurality of side doors in one of the exterior side walls.

65. The shipping container for transporting livestock according to claim 64 wherein the plurality of side doors corresponds to locations for placing adjustable partitions so that each adjustable partition space corresponds to a side door.

66. The shipping container for transporting livestock according to claim 57 further comprising multiple water troughs or nose activated water bowls.

67. The shipping container for transporting livestock according to claim 57 further comprising more than one ventilation fan for producing two way airflow within the shipping container.

68. The shipping container for transporting livestock according to claim 67 where at least one of the ventilation fans is mounted at an angle in order to produce more than one direction or airflow.

69. The shipping container for transporting livestock according to claim 57 further comprising a water connection for connecting to an outside source of water.

70. The shipping container for transporting livestock according to claim 57 further comprising an external electricity hook up.
71. The shipping container for transporting livestock according to claim 70 wherein the electricity hook up provides power to the ventilation fan.

72. A method of transporting livestock comprising the steps of:
   a. separating a shipping container into a separate livestock storage area and feed storage area, wherein the feed storage area provides a continuous opening formed from a substantially vertical sidewall space and a substantially horizontal overhead space;
   b. loading feed into the substantially horizontal overhead space of the feed storage area;
   c. loading livestock in the livestock storage area; and
   d. maintaining separation between the substantially horizontal overhead space of the feed storage area and livestock.

73. The method of transporting livestock according to claim 72 further comprising the steps of:
   a. providing a trough in the substantially vertical sidewall space of the feed storage area which is accessible from the livestock storage space; and
   b. periodically releasing measured amounts of feed from the substantially horizontal overhead space of feed storage area into the trough during transport.

74. The method of transporting livestock according to claim 72 wherein the step of loading feed in the feed storage area further comprises loading at least one week’s worth of feed in the feed storage area.

75. The method of transporting livestock according to claim 72 wherein the step of loading feed in the feed storage area further comprises loading at least two weeks worth of feed in the feed storage area.

76. The method of transporting livestock according to claim 73 wherein the step of periodically releasing measured amounts of feed further comprises releasing roughly equal portions of feed rationed to last the estimated duration of transport.
77. The method of transporting livestock according to claim 73 further comprising the step of accessing the trough and the substantially horizontal overhead space of feed storage area periodically for moving measured amounts of feed into the trough.

78. The method of transporting livestock according to claim 72 wherein the feed comprises pellets.

79. The method of transporting livestock according to claim 78 wherein the pellets are fortified with nutrients and antibiotics.

80. The method of transporting livestock according to claim 73 further comprising the step of actuating a device for releasing a measured portion of pellets trough.

81. The method of transporting livestock according to claim 72 further comprising the step of connecting the shipping container to an external source of water and electricity.

82. The method of transporting livestock according to claim 81 further comprising the step of connecting the shipping container to a second shipping container for providing a source of water and electricity to the second shipping container.

83. The method of transporting livestock according to claim 73 further comprising the steps of:
   a. transporting the shipping containers, loaded with livestock and feed, from a first destination to an intermediate destination with a ground transport;
   b. transferring the shipping containers from ground transportation to a shipping vessel at the intermediate destination;
   c. sailing said shipping vessel to a second destination; and
   d. unloading the shipping containers from the shipping vessel at the second destination.

84. The method of transporting livestock according to claim 83 the first destination comprises a quarantine location where livestock are kept prior to shipment.

85. The method of transporting livestock according to claim 83 wherein the shipping containers are located at least 6 inches apart on the shipping vessel.

86. The method of transporting livestock according to claim 83 wherein the shipping containers are located at least 12 inches apart on the shipping vessel.
87. The method of transporting livestock according to claim 83 wherein shipping containers are lifted directly from the ground transportation onto the shipping vessel.

88. The method of transporting livestock according to claim 87 further comprising the step of: lining up multiple ground transports for sequentially unloading respective shipping containers from each ground transport onto the shipping vessel.

89. The method of transporting livestock according to claim 83 wherein the shipping containers are stored on one selected from the group consisting of: the deck of the shipping vessel, the hull of the shipping vessel, and combinations thereof.

90. The method of transporting livestock according to claim 83 wherein each shipping container is loaded with livestock to have an even weight distribution in each shipping container.

91. The method of transporting livestock according to claim 90 further comprising the steps of:
   a. loading a portion of the livestock designated for a particular shipping container;
   b. isolating the loaded livestock into a corresponding proportional section of the container; and
   c. sequentially loading portions of the designated livestock into corresponding proportional sections of the livestock container until each designated livestock is loaded.

92. The method of transporting livestock according to claim 91 wherein one half of the livestock are loaded into a shipping container then isolated one side of the container, then the other half of the livestock are loaded onto the other side of the container.

93. The method of transporting livestock according to claim 92 wherein the step of isolating the loaded livestock further comprises securing a gate in about the middle of the container.

94. The method of transporting livestock according to claim 83 further comprising the step of providing at least one generator for supplying power to the shipping containers.
95. The method of transporting livestock according to claim 83 further comprising the step of: supplying each shipping container with a source of drinking water.

96. The method of transporting livestock according to claim 83 wherein the livestock comprises one selected from the group consisting of cattle, horse, sheep, goat, and pig.

97. The method of transporting livestock according to claim 83 wherein the shipping containers are arranged in at least one row on the shipping vessel.

98. The method of transporting livestock according to claim 97 wherein the shipping containers are arranged in at least one row having between about two and about eighty shipping containers.

99. The method of transporting livestock according to claim 83 wherein the shipping containers are configured to supply livestock with food, water, protection from weather and provide an air exchange.

100. The method of transporting livestock according to claim 83 wherein the step of transferring the shipping container onto the shipping vessels is carried out by lifting the shipping container with crane on the shipping vessel.

101. The method of transporting livestock according to claim 83 wherein the step of transferring the shipping container onto the shipping vessels is carried out by lifting the shipping container with crane operated off the shipping vessel.

102. The method of transporting livestock according to claim 72 further comprising the steps of:

a. providing a shipping container;

b. modifying the shipping container;

c. maintaining separation between stored feed and the livestock in each shipping container once both are loaded;

d. loading the shipping container on a shipping vessel;

e. supplying the shipping container with a source of water on the shipping vessel;

f. supplying the shipping container with a source of electrical power on the shipping vessel;

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g. voyaging the shipping vessel from a departing location to an destination location;

h. circulating water from the source of water to the shipping containers throughout the voyage; and

i. periodically distributing portions of feed to the livestock in the shipping container.

103. The method of transporting livestock according to claim 102 wherein the step of modifying a shipping container further comprises the steps of:

a. creating ventilation openings in the shipping container;

b. reinforcing the shipping container at the ventilation openings; and

c. sealing at least a portion of the shipping vessel to prevent liquids and solids from escaping from the interior of the shipping container.

104. The method of transporting livestock according to claim 102 further comprising the step of loading each shipping container with sufficient food for each animal for the voyage.

105. The method of transporting livestock according to claim 104 wherein the step of periodically distributing portions of feed further comprises periodically distributing measured portions of the stored feed.

106. The method of transporting livestock according to claim 105 wherein the timing of the periodic feed release and the quantity of released feed is coordinated with the quantity of feed on each shipping container so that the feed lasts for at least substantially the entire voyage.

107. The method of transporting livestock according to claim 102 wherein the step of circulating the water further comprises continuously circulating water in order to prevent freezing.

108. The method of transporting livestock according to claim 102 wherein the step of circulating water from the water source further comprises the steps of:

a. pumping water from a ballast tank of the shipping vessel; and

b. pumping the water into each of the shipping containers on the shipping vessel.
109. A method of modifying a shipping container to accommodate the shipment of livestock comprising the steps of:
   a. acquiring a shipping container having a roof, a bottom, at least four sides;
   b. cutting at least one ventilation opening in at least one of the at least four sides;
   c. reinforcing the at least one ventilation opening;
   d. installing a feed partition on the interior of the shipping container;
   e. installing at least one trough adjacent to the feed partition; and
   f. installing at least one water bowl adjacent to the feed partition.

110. The method of modifying a shipping container according to claim 109 further comprising the step of separating the interior of the shipping container into a
   a. livestock storage area; and
   b. a feed storage area having a substantially horizontal overhead space and a substantially vertical sidewall space formed in the interior storage space, wherein the substantially horizontal overhead space and the substantially vertical sidewall space form a continuous opening in the interior storage space.

111. The method of modifying a shipping container according to claim 109 wherein the step of reinforcing the ventilation openings further comprises welding a metal frame into at least one of the ventilation openings.

112. The method of modifying a shipping container according to claim 111 wherein the metal frame comprises a tubular metal frame or metal plates.

113. The method of modifying a shipping container according to claim 109 wherein the step of installing a feed partition further comprises the steps of:
   a. fabricating a vertical partition; and
   b. welding the vertical partition into place within the shipping container.

114. The method of modifying a shipping container according to claim 113 further comprising the step of connecting a horizontal partition to the vertical partition forming an enclosure within the shipping container.
115. The method of modifying a shipping container according to claim 114 wherein the at least one trough and the at least one water bowl are located outside the enclosure.

116. The method of modifying a shipping container according to claim 109 further comprising the step of configuring the shipping container to receive a supply of water.

117. The method of modifying a shipping container according to claim 109 further comprising the step of configuring the shipping container to receive a supply of electrical power.

118. The method of modifying a shipping container according to claim 109 further comprising the step of sealing the bottom of the shipping container to prevent leaking.

119. The method of modifying a shipping container according to claim 109 further comprising the step of installing at least one fan in the shipping container to promote air flow.

120. The method of modifying a shipping container according to claim 119 further comprising the step of installing at least two fans in the shipping container to promote air flow.

121. A method of transporting livestock comprising the steps of:
   a. categorizing livestock by weight;
   b. determining the area required by the livestock in each category of livestock;
   c. determining the capacity of shipping containers for each category of livestock;
   d. loading livestock from a single category into a shipping container not exceeding the capacity of the shipping container for that category;
   e. loading livestock from a second category into a second shipping container not exceeding the capacity of the second shipping container;
   f. loading the shipping containers onto a shipping vessel;
   g. transporting the shipping vessel to a destination location;
   h. unloading each of the shipping containers from the shipping vessel at the destination location; and
i. unloading the livestock from each of the shipping containers.

122. The method of transporting livestock according to claim 121 further comprising the steps of:
   a. loading about one half of the shipping containers capacity of livestock;
   b. isolating the loaded livestock on one side of the container; and
   c. loading the other one half of the containers capacity into the other side of the shipping container.

123. The method of transporting livestock according to claim 121 further comprising the step of providing the shipping container with a source of food and a source of water.

124. The method of transporting livestock according to claim 123 wherein the volume of food and water in each shipping container depends on the category of livestock in each shipping container.

125. The method of transporting livestock according to claim 121 wherein livestock is additionally categorized as having been artificially inseminated before transport.

126. The method of transporting livestock according to claim 125 wherein livestock categorized as having been artificially inseminated before transport are provided with shipping containers having circulation fans and access to water from anywhere in the shipping container.

127. The method of transporting livestock according to claim 125 wherein livestock categorized as having been artificially inseminated before transport are provided with additional space sufficient for birthing a calf.

128. The method of transporting livestock according to claim 121 wherein the livestock comprises heifers gestating embryos.

129. The method of transporting livestock according to claim 121 wherein the animals are additionally categorized by health status.

130. The method of transporting livestock according to claim 129 wherein each category of livestock loaded into shipping containers are of a like health status.

131. The method of transporting livestock according to claim 130 wherein livestock categorized in a negative health status are isolated from those determined to be healthy during shipment.
132. The method of transporting livestock according to claim 121 wherein each container is loaded with feed according to the category and number of livestock.

133. A method of doing business comprising the steps of:
   a. booking a shipping vessel for a desired destination;
   b. coordinating a quarantine area a predetermined amount of time before the scheduled shipment;
   c. arranging the transport of the shipping containers to the shipping vessel;
   d. arranging the transfer of the shipping containers onto the shipping vessel and the connection of water and electric power to the shipping containers; and
   e. coordinating the pickup of the shipping containers at a destination port for delivery.

134. The method of doing business according to claim 133 wherein the shipping vessel is also carrying non-livestock cargo and the shipping containers with livestock are loaded along with the bulk goods.

135. The method of doing business according to claim 134 wherein the non-livestock cargo comprises dry bulk goods.

136. The method of doing business according to claim 133 wherein the cost of shipping livestock is reduced by booking space alongside non-livestock cargo.

137. The method of doing business according to claim 136 wherein livestock transportation in the livestock shipping containers cost less than 1%, 5%, 10%, 20%, 50%, 80%, or 85% the total cost of the freight on the shipping vessel.

138. The method of doing business according to claim 133 further comprising the step of providing an attendant to accompany the livestock shipping containers.

139. The method of doing business according to claim 138 wherein the attendant evaluates the power supply and water supply to each of the shipping containers regularly to ensure healthy livestock arrive at the desired destination.

140. The method of doing business according to claim 133 wherein animals in one or more livestock shipping containers are of the same species.

141. The method of doing business according to claim 133 wherein livestock being shipped comprise artificially inseminated heifers.
142. The method of doing business according to claim 141 wherein the artificially inseminated livestock being transported have been artificially inseminated with sex sorted sperm.

143. The method of doing business according to claim 133 wherein livestock shipping containers are loaded directly from trucks onto the shipping vessel for loading, or the shipping containers are loaded directly from the shipping vessel to trucks during unloading.

144. The method of doing business according to claim 133 further comprising the step of modifying the container which comprises:
   a. cutting ventilation openings in the shipping container;
   b. reinforcing the shipping container at the ventilation openings;
   c. sealing at least a portion of the shipping vessel to prevent liquids and solids from escaping from the interior of the shipping container;
   d. providing airflow within the shipping container;
   e. installing a partition to separate livestock from livestock feed;
   f. creating an area to store feed; and
   g. creating a personnel opening to access the stored feed.

145. A system for shipping livestock comprising:
   a. at least two shipping containers, each shipping container adapted for transporting livestock; and
   b. a common resource in communication with the at least two shipping containers.

146. The system for shipping livestock according to claim 145 wherein the common resources comprises a water delivery system comprising:
   a. a water source;
   b. a pressure source in communication with the water source; and
   c. at least one delivery line in communication between each shipping container and the water source.

147. The system for shipping livestock according to claim 146 wherein the delivery line feeds at least two shipping containers in series.
148. The system for shipping livestock according to claim 146 wherein the delivery line branches into at least two supply lines which feed the at least two shipping containers in parallel.

149. The system for shipping livestock according to claim 146 wherein the at least two shipping containers have livestock storage areas and feed storage areas.

150. The system for shipping livestock according to claim 146 further comprising at least two supply lines connected to the delivery line in parallel for supplying water to shipping containers in parallel.

151. The system for shipping livestock according to claim 150 wherein the supply lines deliver water from the delivery line to individual shipping containers.

152. The system for shipping livestock according to claim 151 wherein each supply line is connected to the delivery line through a shutoff valve wherein individual supply lines can be shut off without effecting the supply of water to the remaining supply lines.

153. The system for shipping livestock according to claim 146 wherein the delivery line further comprises an insulated material.

154. The system for shipping livestock according to claim 153 wherein the insulated material comprises a cross linked polyethylene.

155. The system for shipping livestock according to claim 146 wherein the shipping containers are loaded on a shipping vessel.

156. The system for shipping livestock according to claim 155 wherein the shipping vessel further comprises a ballast tank.

157. The system for shipping livestock according to claim 156 wherein the ballast tank is the water source.

158. The system for shipping livestock according to claim 157 wherein the ballast tank is pressure washed, and filled with fresh water in order to provide a water source.

159. The system for shipping livestock according to claim 158 further comprising an intermediate water storage tank.

160. The system for shipping livestock according to claim 159 wherein the pressure source comprises a ballast pump.
161. The system for shipping livestock according to claim 160 further comprising a circulation pump for circulating water to each of the shipping containers from the intermediate water storage tank.

162. The system for shipping livestock according to claim 160 wherein the intermediate water storage tank is located within a shipping container.

163. The system for shipping livestock according to claim 160 wherein the intermediate water storage tank comprises a bladder.

164. The system for shipping livestock according to claim 146 further comprising a manifold connected to the intermediate water storage tank for running more than one delivery line or more than one supply line.

165. The system for shipping livestock according to claim 145 wherein the common resources comprises an electrical power source.

166. The system for shipping livestock according to claim 166 further comprising a transformer for stepping down the voltage of the electrical power source.

167. The system for shipping livestock according to claim 166 wherein each shipping container includes a transformer.

168. The system for shipping livestock according to claim 165 wherein the electrical power source is one selected from the group of: a gas powered generator, a solar powered generator, a hydrogen generator, and combinations thereof.

169. The system for shipping livestock according to claim 165 wherein each container includes a control box for receiving electrical power, and wherein an array of containers are supplied electrical power in parallel.

170. The system for shipping livestock according to claim 165 wherein each container includes a control box for receiving electrical power, and wherein an array of containers are supplied electrical power in series.

171. A water delivery system for supplying drinking water to multiple shipping containers on a shipping vessel comprising:
   a. a water source containing drinking water;
   b. a pressure source in communication with the water source for circulating water from the water source; and
c. at least one shipping container connected to the water source through a delivery line for delivering drinking water to the shipping container.

172. The water delivery system according to claim 171 wherein the water source is one selected from the group consisting of: a shipping container with a bladder, a tank within a container, and a modified ballast tank.

173. The water delivery system according to claim 171 further comprising a manifold for receiving water from the water source though a delivery inlet line.

174. The water delivery system according to claim 171 wherein the at least one delivery line comprises a plurality of delivery lines connected to the manifold for connecting the water supply to a plurality of shipping containers or groups of shipping containers.

175. The water delivery system according to claim 174 wherein each of the delivery lines supply a plurality of shipping containers.

176. The water delivery system according to claim 175 further comprising individual supply lines connected to the delivery line at shut off valves.

177. The water delivery system according to claim 176 wherein the supply lines are connect to individual shipping containers.

178. The water delivery system according to claim 177 wherein the supply lines supply water to rows of shipping containers.

179. The water delivery system according to claim 171 wherein the water source comprises water stored in the ballast tank of a water vessel.

180. The water delivery system according to claim 171 wherein the pressure source comprises a pump.

181. The water delivery system according to claim 171 further comprising an intermediate water storage tank.

182. The water delivery system according to claim 181 wherein the intermediate water storage tank comprises a bladder.

183. The water delivery system according to claim 171 wherein the delivery line connects at least two supply lines in parallel.
184. The water delivery system according to claim 183 wherein each supply line is connected to the delivery line through a shutoff valve wherein individual supply lines can be shut off without effecting the supply of water to the remaining supply lines.

185. The water delivery system according to claim 171 wherein the water source comprises a water tank stored within a shipping container on the vessel.

186. The water delivery system according to claim 171 wherein the water source comprises a liquid shipping container.

187. A method of circulating drinking water for livestock on a shipping vessel comprising the steps of:
   a. emptying a ballast tank of the shipping vessel;
   b. cleaning the interior of the ballast tank;
   c. filling the ballast tank with fresh water; and
   d. pumping the fresh water from the ballast tank to shipping containers throughout a shipment.

188. The method of circulating drinking water according to claim 187 wherein the step of cleaning the ballast tank further comprises:
   a. pressure washing the interior of the ballast tank;
   b. coating the interior of the ballast tank.

189. The method of circulating drinking water according to claim 187 further comprising the step of pumping fresh water from the ballast tank to an intermediate tank for temporary storage.

190. The method of circulating drinking water according to claim 189 further comprising the step of pumping water from the intermediate tank to shipping containers housing livestock.

191. The method of circulating drinking water according to claim 190 wherein the livestock access the drinking water through nose operated water bowls.

192. The method of circulating drinking water according to claim 191 further comprising the step of circulating the water from the shipping containers to the intermediate tank
to prevent freezing and to warm the water with the body heat of the livestock in their respective shipping containers.

193. A shipping container comprising:

a. a front wall, a back wall a first sidewall, and a second sidewall connecting a roof to a bottom enclosing an interior storage space;

b. a ventilation opening formed in at least one of the first sidewall and the second sidewall, wherein the ventilation opening is reinforced;

c. a feed partition dividing the shipping container into a feed storage area and a livestock storage area, the feed partition comprising:

i. a vertical partition having a feed space opening, the vertical partition comprising a plurality of vertical spaced members and crossbeams arranged to form a framework with the feed space openings;

ii. a horizontal partition connected to the vertical partition and extending over the livestock storage area to form a substantially horizontal overhead space;

iii. a catwalk extended from the vertical partition, the catwalk comprising at least one elongate member;

d. at least one water bowl located in the feed storage area, the feed space openings providing livestock in the livestock storage area access to the at least one water bowl;

e. at least one trough located in the feed storage area, the feed space openings providing livestock in the livestock storage are to the at least one trough;

f. at least one enclosure gate dividing the livestock storage area into at least two compartments;

g. at least one ventilation fan;

h. a bedding layer on the bottom of the interior storage space; and

i. a personnel opening formed in the front wall providing access from the exterior of the shipping container to the catwalk and the feed storage area.