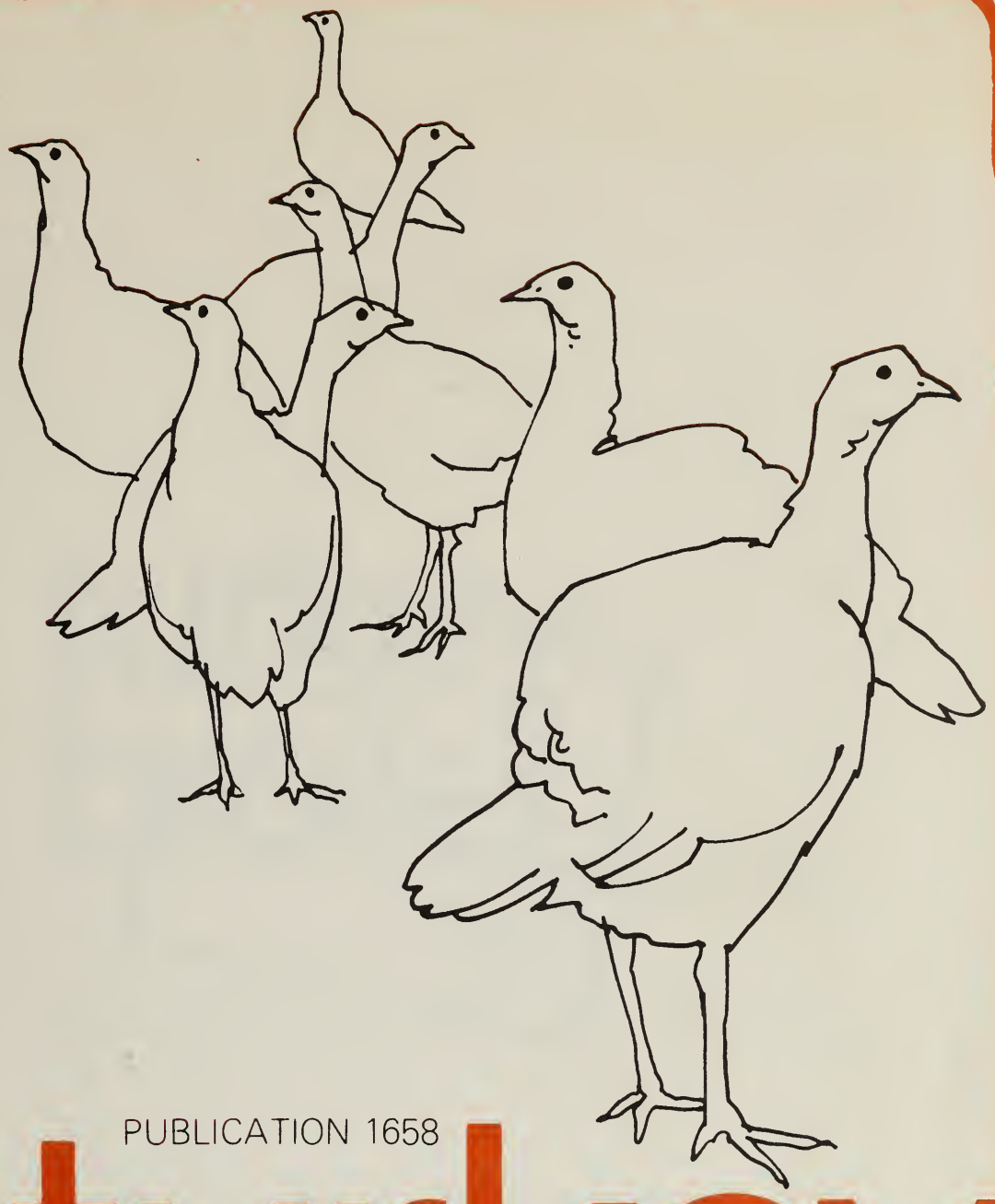

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turkey broiler production

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turkey broiler production

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CONTENTS

Revenue from the production of poultry meats, including turkey meat, contributes significantly to the Canadian farm income. Turkey meat presently constitutes about 21% of the poultry meat produced in Canada. Most turkey meat now being produced consists of turkey broilers that weigh about 5 kg. The production of light-weight poults in Canada has increased considerably in recent years from 4 million in 1961 to 10.7 million in 1979. This increase in production has occurred because consumers have come to prefer a smaller bird. Previously, consumers tended to buy larger turkeys for special occasions, such as Thanksgiving and Christmas.

Fig. 1 The number of turkey poults started as broilers in Canada, 1961-79.

Turkeys can adapt to and thrive in a wide variety of climatic conditions. They can be raised almost anywhere that proper housing and nutrition are provided and appropriate management procedures are followed.

In provinces where marketing boards have been established, a person must obtain a license or a quota to produce and market turkey broilers. The quantity of turkey broilers a grower can sell on the market is normally limited, so that the local supply of poultry meat

being produced is controlled. Marketing boards are then able to adjust market prices and unit sizes within certain limits.

Most turkey broilers are raised under contract as part of an integrated turkey broiler production operation, usually planned by poultry processing and feed manufacturing organizations. Feed is supplied by the feed manufacturing organization to the grower, who in turn ships turkey broilers to the poultry processing organization. Naturally, a turkey hatchery must be included to provide day-old poults to the grower. This type of operation requires long-range planning to achieve the most efficient utilization of labor, capital, and facilities at all levels of production and marketing.

Table 1. Turkey broilers placed and marketed in Canada, 1973-79

Year	Birds placed No.	Birds marketed No.
1973	11 914 000	11 318 000
1974	9 964 000	9 466 000
1975	9 772 000	9 283 000
1976	10 008 000	9 508 800
1977	9 140 000	8 683 000
1978	8 252 000	7 839 400
1979	10 682 000	10 147 900

Source: Poultry Market Report, Agriculture Canada.

Table 2. Performance of a sampling of turkey broilers produced in Canada, 1973-79

Year	Average live weight kg	Feed efficiency	Return per bird over cost of feed and poults $
1973	4.9	2.70	0.59
1974	4.8	2.54	0.88
1975	4.8	2.55	1.00
1976	4.8	2.41	1.32
1977	4.9	2.40	1.16
1978	5.0	2.41	1.36
1979	4.8	2.46	1.36

Source: Data supplied by Nova Scotia Turkey Marketing Board.

Table 3. Percentage cost of each item in the production of turkey broilers

Item	Monthly sampling	
	Jan. 1979	Jan. 1980
Feed	55.1	54.2
Poults	14.6	15.0
Depreciation	5.2	5.2
Other costs (labor, interest, energy, taxes, insurance, etc.)	19.4	18.7
Investment return	5.7	6.9

Source: Cost of production data provided by the Nova Scotia Turkey Marketing Board.

A turkey broiler producer grows a fairly large number of birds per year and expects a reasonable profit per bird (Tables 1 and 2). The costs of feed and poults represent about 70% of the expenses of the operation, with other costs being comparatively low (Table 3). This type of large-scale operation responds favorably to good management.

VARIETIES

Several standard varieties of turkeys are recognized by the American Poultry Association and are described in the American Standard of Perfection. Among the most prominent are Beltsville Small White, Narragensett, Slate, White Holland, Bourbon Red, and Bronze. Non-standard varieties such as the Broad Breasted Bronze and the Broad Breasted Large White are also commercially significant.

The Bronze variety originated in North America and has become the most widely grown of all the varieties. The Broad Breasted Bronze resembles the standard Bronze variety, although it tends to have buffy white instead of pure white feather tips. The basic plumage of this variety is black.

The Broad Breasted Large White was developed in the early 1950s, through pedigree breeding and selection at Cornell University from crosses of Broad Breasted Bronze and White Holland. Private breeders soon began to develop other strains, mainly through crossbreeding.

Most breeders named their own strains. Selection for Large White and Broad Breasted conformation has been intensive because of the important commercial value of this trait. Most strains of Broad Breasted Large White are now equal to Broad Breasted Bronze in this respect. The white pin feathers on the carcass of an immature bird of this variety are less noticeable than the colored pin feathers of colored varieties. This characteristic gives the Broad Breasted Large White variety a definite market advantage. The genetic factor responsible for its white plumage is a recessive gene with no significant adverse effects on other characters.

The Beltsville Small White variety was developed by the U.S. Department of Agriculture at the Agricultural Research Centre in Beltsville, Md., between 1941 and 1962. This stock has been distributed throughout the world. It is smaller in size, and is generally better in egg production, fertility, and hatchability, and tends to be less broody than larger-sized varieties. When marketed as broilers, these birds are usually slaughtered at 14 weeks of age.

From these basic stocks, Canadian turkey breeders have successfully developed specialty varieties suited to both broiler and roaster production.

HATCHERY PRACTICES

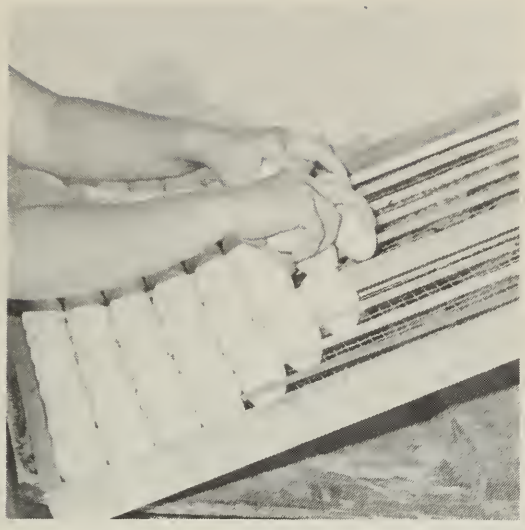
Hatchery practices are a specialized management item in the production of turkeys (see Figs. 2-9).

There are two types of incubators in use: the small incubator with a capacity of 50-200 eggs and the larger type with a capacity of 2500-100 000 eggs.

The five factors that affect incubation are temperature, humidity, ventilation, position, and turning of eggs.

Small still-air incubators are usually operated at a temperature of 38-39°C. Large incubators with forced-air circulation are usually kept at a temperature of 37-38°C with the hatcher operated at a slightly lower temperature. As temperature requirements vary slightly among different types of incubators and hatchers, manufacturers directions should be followed carefully.

It is important to control the humidity in an incubator for two reasons. First, too much loss of moisture from the egg will kill the embryo because it will adhere to the shell. Second, insufficient



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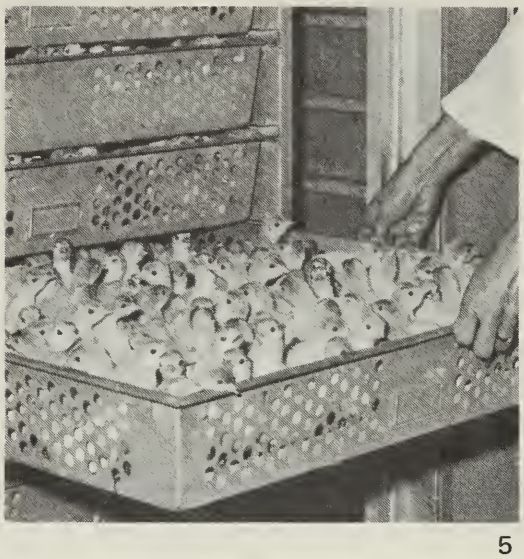

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Fig. 2 Turkey eggs are trayed large end up before they are put in an incubator.

Fig. 3 Trays of eggs are placed in an incubator. The eggs remain there for 25 days.

Fig. 4 Before going into the hatcher, the eggs are candled to remove infertile eggs and eggs with dead embryos. The eggs usually hatch in four more days.

Fig. 5 After 29 days of incubation the poults are removed from the hatcher trays.

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Fig. 6 After removal from the hatcher, the poults are culled to remove weak and deformed birds.

Fig. 7 If desired, the poults are sexed so that each sex may be raised separately.

Fig. 8 Before the poults leave the hatchery, they are frequently given an injection to protect them against the stress of shipping.

Fig. 9 All the hatchery equipment must be washed and sanitized before it is used for the next hatch.

evaporation from the egg will cause death because of a lack of oxygen in the air cell. Relative humidity is usually maintained at 68-70%.

Ventilation requirements are affected by such factors as room temperature and humidity, number of eggs set, period of incubation, and the air movement in the incubator.

Eggs are horizontally set in small incubators and vertically set with large end up in large incubators. Eggs should be turned at least twice daily in small incubators, and in large incubators they are incubated at a 45° angle and turned automatically every hour to prevent the egg contents from adhering to the shell.

Hatchability will vary depending on fertility and other factors, but should be at least in the 70 to 80% range.

HOUSING

Location

Locate turkey houses on well-drained land with an adequate water supply. Easy access to truck transportation for delivery of feed and poults and pick-up of ready-for-market turkeys is also recommended. Contact the appropriate authorities regarding zoning, and environmental and health regulations, before construction begins.

Construction

Turkey houses vary considerably in design. Most newer units are windowless and are constructed with metal sheeting on the exterior walls and roof. These buildings are up to 90 000 mm long, about 12 000 mm wide, and have a truss type of roof. Frequently, a rigid type of insulation material covered with plywood or other firm material is used in areas accessible to the poults to prevent damage to the insulation. Insurance requirements should also be considered, because some insulation materials are a fire hazard.

It is essential to have on the premises an incinerator or other approved means of disposing of dead birds.

When turkey houses are being constructed, make special provisions for the removal of the flock at slaughter time. Use feeding and

watering systems suspended from the ceiling so that they can be removed, and provide side doors to facilitate the removal of crated birds.

Further information on the construction of turkey housing may be obtained from provincial agricultural engineering offices.

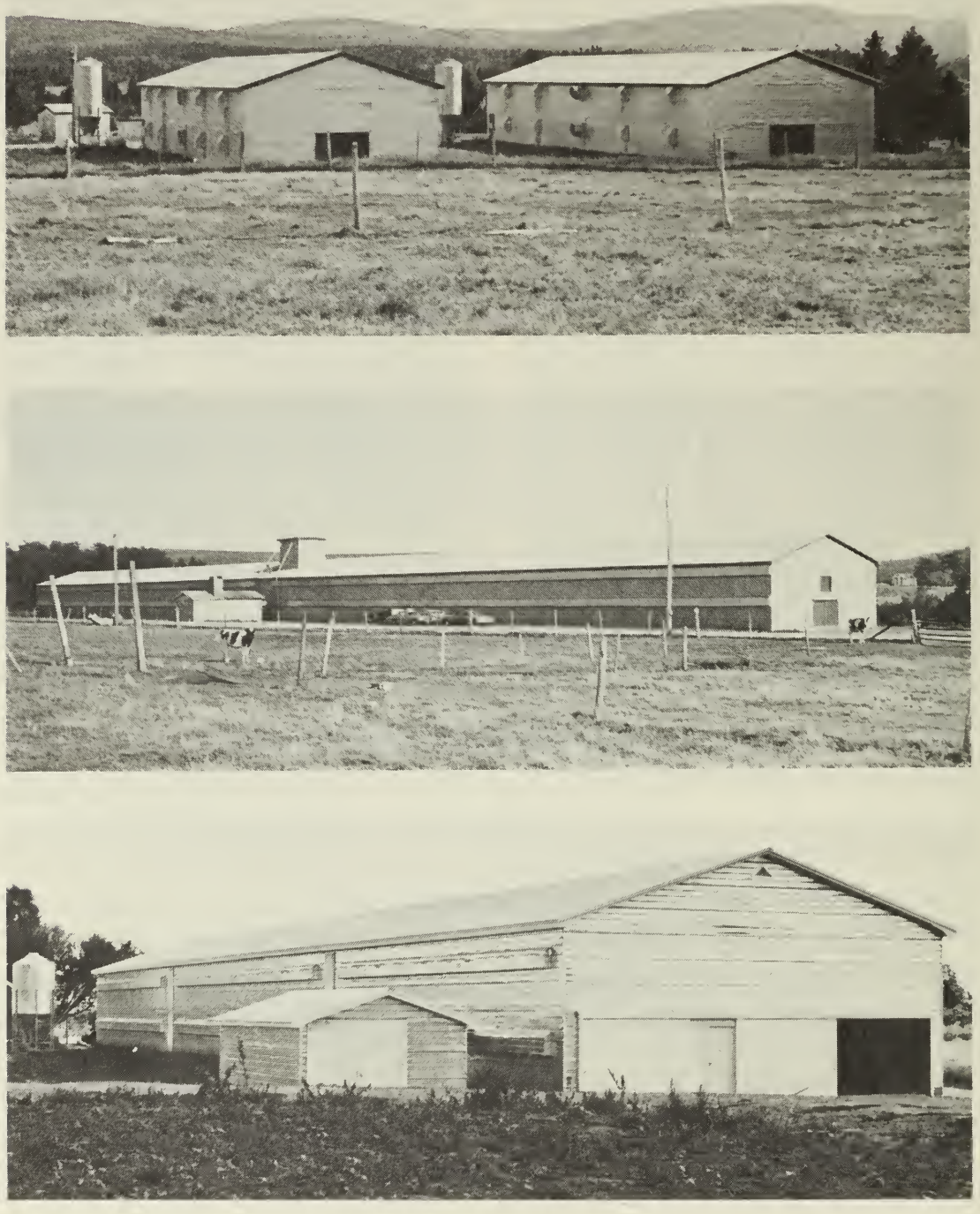
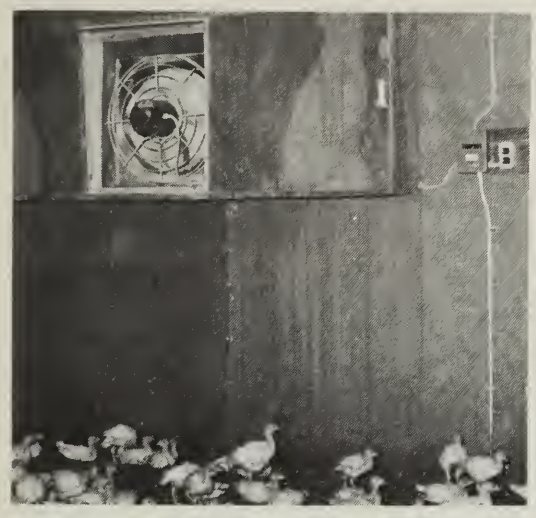


Fig. 10 Three modern turkey buildings.

Ventilation equipment

Generally, turkey houses are constructed so that ventilation is controlled by the use of high-speed or multi-speed fans operated both continuously and thermostatically. The ventilation system must let air into the building in a way that avoids drafts on the poults, and yet promotes air mixing, air exchange, and dust removal. A smaller air intake is required in winter because cold air entering the building has a larger expansion ratio than the warmer air that enters at other times of the year.



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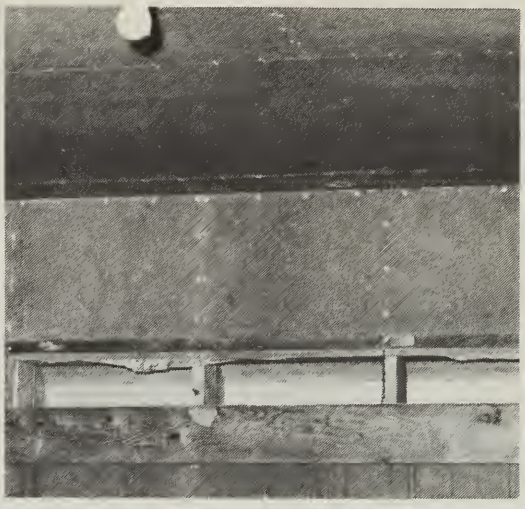

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Fig. 11 High-speed fan for exhausting air from turkey buildings.

Fig. 12 Air intake opening than can be adjusted for the amount of air required.

The ventilation system should be able to remove about 0.06 m^3 of air per minute per kilogram of turkey housed. Many different ventilation systems are available. Most may be classified into either of two types: negative pressure or positive pressure. In a negative pressure system, exhaust fans expel air that has been drawn in through passive intakes, usually located in the opposite wall. The positive pressure system uses fans to force air into the pen area, and air escapes out through ventilation openings. This method makes it easy to filter the incoming air, a decided advantage from the standpoint of disease control, and it provides uniform air change without drafts.

Make some provision for emergency ventilation in the event of an electric power failure. This can be done by either providing sufficient

auxiliary electric power to operate fans or by installing kick-out doors in the side of the building, which can be opened to allow natural airflow to prevent birds suffocating. However, care must be taken when opening kick-out doors, because sudden exposure to high-intensity natural light makes turkeys extremely nervous. The flock can panic toward the light, which can result in smothering.

Auxiliary power

A generator is required for auxiliary electric power to maintain essential services, such as heating, lighting, and ventilation, during power failures. A generator may be operated either by a stationary engine or from a tractor power take-off. A battery-operated alarm system, which would be activated by a power failure or when extreme temperature occurs, should be installed in the turkey house and wired to the operator's residence. Reduced line voltage (brown-outs) can seriously damage electric motors.

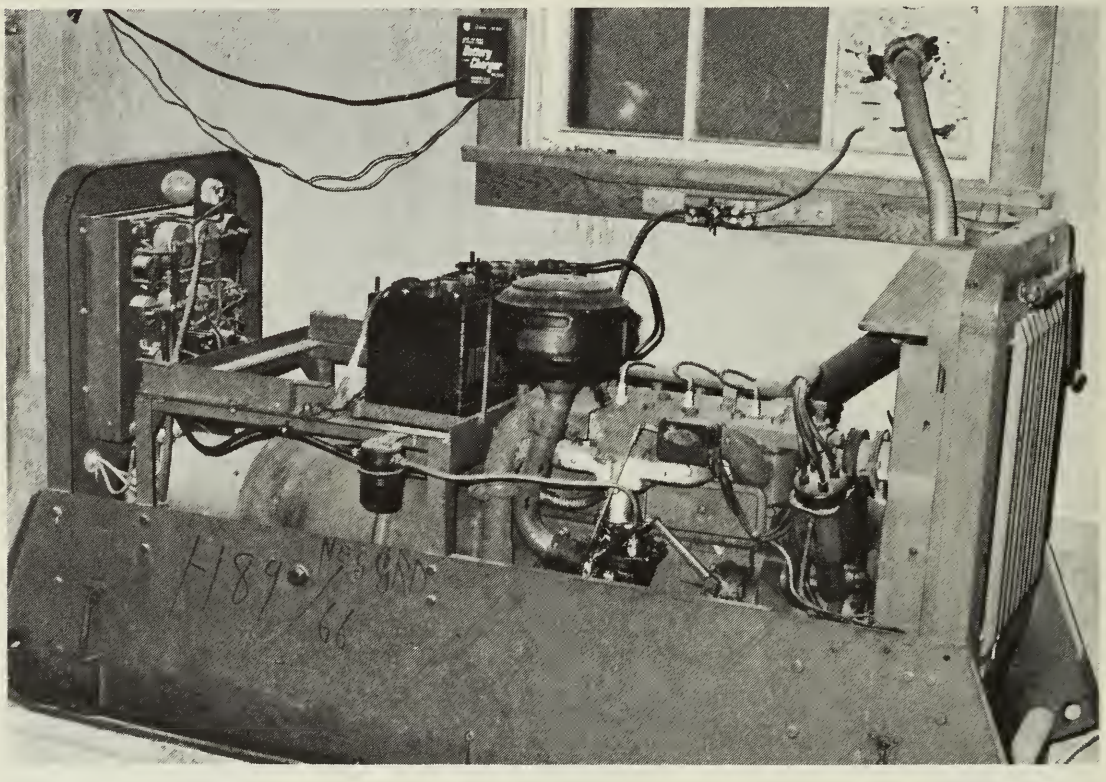

Fig. 13 An auxiliary power unit used to provide electricity for essential equipment during periods of power failure.

Brooding

Heating systems

Start the brooder heating system at least 48 h before poults are scheduled to arrive. This ensures that the system is operating properly and allows the building to become warm.

Place poults under brooders as soon as possible. Be sure to provide easy access to water and feed during the first days. Severe losses can result if poults fail to find the water founts and feeders.

Installation of poult guards 46 cm high reduces floor drafts and prevents the poults from wandering too far from the source of heat. The guards also reduce the risk of crowding. An area with no corners helps to prevent poults piling and smothering. In a large pen, it is advantageous to use only part of the pen area during the first 10 days. A plastic curtain can be used as a partition. Its installation will reduce fuel costs with some brooding systems.

Various types of brooders have been used to provide the supplemental heat required by young turkeys. Early in the development of the industry, heat lamps and oil-, gas-, wood-, and coal-fired brooders were used. These individual brooder units have largely been replaced by a centrally located oil furnace with either a hot-

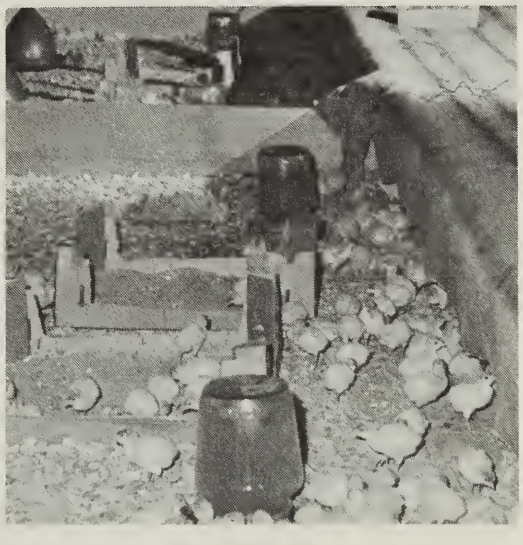

Fig. 14 Hot water circulates through pipes to provide heat for poults.

Fig. 15 Hot-water brooding system, showing the carboard poult guards and the waterers and feeders for starting poults.

water or hot-air system that conveys the heat to the poults. The furnace or furnaces are often located in a separate building to reduce the risk of fire in the turkey-growing house and to decrease fire insurance premiums. A separate furnace building also reduces the danger of disease spread, because it is unnecessary for service personnel to enter the main turkey house.

A hot-water system usually involves the installation of several rows of black iron pipe spaced several centimeters apart. The pipes are usually situated along the length of the pen. A plywood boxlike cover is placed over the pipes and filled with 5–7 cm of shavings for insulation. During the first few days, poults are confined to within 90 cm of this cover by a cardboard guard. After several days, they are released to the entire pen. A disadvantage of this system is that the pipes are an obstruction when removing the birds and cleaning the litter out of the building.

Occasionally, a warm-room system of brooding is used. The entire pen area is heated by using either a ceiling-ducted hot-air system or a hot-water system with black iron pipes installed along one wall of the pen area.

Fig. 16 A warm-room brooding system. Only part of the barn is needed for the initial stages of brooding and rearing.

Disadvantages of the warm-room brooding system are that it tends to dehydrate the birds and gives them little opportunity to adjust their environmental temperature by moving toward or away from the heat source. It can also be uncomfortable for the caretaker to work in these hot surroundings.

Recently, trials using hot-water pipes embedded in a concrete floor have been made to evaluate the possibility of using the warm floor, without any litter, as a brooding system for poults. Under conditions where planer shavings are very expensive or difficult to obtain, it is feasible to use a hot-water-heated floor to provide heat for rearing turkey broilers and to maintain reasonably dry floor conditions.

Temperature

Poults must be started at the correct temperature. Although the correct brooding temperature is indicated by the behavior of the poults, thermometers should be used as a guide. If the temperature is too low, the poults crowd together, stand up, and peep shrilly, or at night they may crowd under the canopy close to the source of heat. If the temperature is too high, they try to avoid the heat source. If the temperature is correct, the poults are active and when resting they settle down in a uniform pattern at the edge of the canopy. Comfortable poults are quiet and uncomplaining.

During the first week maintain a temperature of 40–43° C at the edge of the canopy or coil about 7.5 cm above the floor. As the poults grow and develop, gradually lower the brooding temperature by about 2.5–3.0° C per week, provided they remain comfortable.

If hot-air furnaces are used with no canopy, it is more difficult to maintain a uniform temperature, and the birds have no place to go to escape excessive heat. If the area is too cold, their only means of obtaining additional heat is to crowd together, which can lead to suffocation.

An important factor is the background room temperature, which is closely linked with ventilation. A room temperature of 29–35° C is recommended for starting poults. It can gradually be lowered to 21° C by the 7th week.

Floor space

Start no more than 250 turkey poults per group. When they are 10 days old the groups can be combined. Allow 1 m^2 of brooder area for 55 poults. From the end of the 1st to the 7th week provide 0.09 m^2 per bird. After the 7th week it may be necessary to increase floor area to 0.14 m^2 per bird depending on the light and ventilation control and season of the year. Additional floor space is needed if the flock is to be kept longer than 14 weeks.

Feeding systems

To maintain optimum feed consumption, the poults must have easy access to the feeders (Table 4). A bird should not have to walk more than 3 m to a feeder. During the first few days, place the feed on new carboard trays. Provide two feed trays for each 100 poults. The box in which the poults were shipped may be cut down and used as a feeder. Regular feeding equipment should be introduced by the end of the third day, or it may be used along with feed trays from the start. Remove the feed trays after the poults are eating from the regular feeding equipment. Many kinds of mechanical feeders are available.

Fig. 17 **Poult shipping box cut down for use as a feeder tray for the pre-starter diet fed during the first few days.**

Fig. 18 **A typical mechanical feeder that can be adjusted while birds grow.**

The recommended linear feeder space for poults is 3.5–5 cm of trough space from brooding to 6 weeks and 5–6.5 cm thereafter. As a guide, adjust the lip of the trough to the level of a bird's back.

Table 4. Approximate feed and water consumption of 1000 turkey broilers with sexes intermingled (1976)

Week	Feed, kg		Water per day (L)
	Weekly	Accumulated	
1	84.0	84.0	35
2	168.0	252.0	75
3	266.0	518.0	125
4	387.8	905.8	165
5	545.3	1 451.1	190
6	685.3	2 136.4	210
7	826.0	2 962.4	240
8	953.4	3 915.8	260
9	1 062.6	4 978.4	295
10	1 115.8	6 094.2	325
11	1 276.8	7 371.0	360
12	1 318.1	8 689.1	400
13	1 451.1	10 140.2	450
14	1 531.6	11 671.8	500

Note: The quantities of water and feed consumed vary with environmental temperature, variety of turkey poults, and dietary program.

Watering systems

When poults are first placed under brooders, dip the beaks of some of the birds to familiarize them with the water and its location in order to prevent the birds from dying of thirst.

Two 4.5 L water founts for each 100 birds are recommended for starting poults (Table 4). Of the automatic waterers available, the bell-shaped ones are most often used to complement the founts. The founts should remain in the pen until the poults are accustomed to the automatic waterers. Make sure that all poults find the waterers when the founts are removed. Use enough waterers to provide 1.5 linear m of water space for each 100 poults. Disinfect the waterers two or three times a week with an iodine-base disinfectant. As a guide, adjust the level of the waterer frequently to insure that it is level with a bird's back.

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Fig. 19 Water fount that can be used for starting poults.

Fig. 20 A typical bell-type automatic waterer.

Fig. 21 Automatic waterer and mechanical feeder suspended from the ceiling, which can be raised out of the way when catching birds or cleaning the building. Feeders and waterers should be placed about 3 m apart.

FEEDING

Turkey feeds are usually mixed commercially by feed manufacturing plants because it is not considered economical for the individual grower to mix his own rations. Feed comprises 55-60% of the cost of producing turkeys (Table 3). To meet the dietary demands of rapidly growing turkey poults, all nutrients must be accurately balanced. It is important, therefore, that feeding be given special attention, particularly the protein quality and the protein-to-energy

Fig. 22 Corrugated metal bulk-feed tank.

ratio. Although a great deal is known concerning the formulation of turkey diets, there are still areas where further information would be beneficial. There is probably no single formula for the most efficient feeding of the turkey flock. Many formulas yield satisfactory results. Unfortunately, because feed ingredients vary considerably in nutrient value, this introduces an undesirable variable into the problem of feed formulation. As a safeguard against nutritional deficiencies, feed manufacturers select a fairly wide range of ingredients as nutrient sources.

Crumbles and pellets are more efficient feeds than mash. Feed wastage is often associated with having the feed pans too full.

Crumbled and pelleted feed is usually purchased in bulk and stored in upright metal tanks. The feed is moved by auger from the storage tank to the automatic feeders. Take care that bulk-feed tanks and augers are watertight to prevent the accumulation of moldy feeds. Do not use moldy feed and do not store feed for more than one month. If possible, locate feed tanks on the shady side of buildings.

Although feeding systems vary, a typical program might consist of:

1. Poult prestarter (medicated) from 1 day to 4 weeks of age.
2. Poult starter (medicated) from 4 to 7 weeks of age.
3. Poult grower No. 1 (medicated) from 7 to 9 weeks of age.
4. Turkey broiler grower No. 2 (medicated) from 9 to 11 weeks of age.
5. Turkey broiler grower No. 3 (medicated) from 11 to 12 weeks of age.
6. Turkey broiler finisher from 12 weeks of age until the flock goes to market.

Poult prestarter, poult starter, and poult grower No. 1 diets are medicated for the prevention of coccidiosis and blackhead. Turkey broiler growers No. 2 and No. 3 and turkey broiler finisher should also be medicated for the prevention of coccidiosis and blackhead. Finisher diets fed during the week before slaughter must not contain medicants (Table 5). Recent research provides some evidence that the feeding system may be simplified by using only three diets: (1) starter from 1 to 21 days; (2) grower from 22 to 70 days; and (3) finisher from 71 to 98 days of age, with protein (and energy) levels of 29% (12.2 Mj/kg), 22% (13.0 Mj/kg), and 16% (13.6 Mj/kg) for the starter, grower, and finisher diets, respectively.

Table 5. Feeding schedule: a complete ration program

	Percentage of crude protein	Age, weeks	Quantity of feed consumed, kg	
			Male	Female
Prestarter	29	0-4	0.91	0.82
Starter	25	4-7	2.86	2.42
Grower No. 1	21	7-9	1.90	1.54
Grower No. 2	18	9-11	2.58	2.09
Grower No. 3	16	11-12	1.68	1.36
Finisher medicated	14	12-13	1.95	1.54
Finisher nonmedicated	14	13-market	1.00	0.68
Total			12.88	10.45

Further information on feeds and feeding is available from agricultural colleges, provincial extension services, research stations of the Canada Department of Agriculture, and from the turkey breeders and feed manufacturers.

MANAGEMENT PRACTICES

Litter

When using litter, cover the floor with 5 cm of high-quality wood shavings before the poults arrive. Increase this amount later to between 7.5 and 10 cm. Shavings should be large dry curls, free from musty odor. If shavings are not available, sawdust, chopped straw, or hay may be used. Be sure to use fresh litter that contains no dust, molds, or foreign material such as nails.

During the growing period the condition of the litter is affected by temperature, ventilation, and type of waterers used. Avoid too much moisture in the litter, although dusty conditions are also detrimental. Skilled management is required to maintain a proper environmental balance. A cushion of reasonably dry litter helps reduce breast blisters. It is best not to reuse old litter, because disease organisms can be carried over to the next flock.

The hot-water-heated concrete floor has the advantages of simplifying the cleaning process and eliminating the cost of litter. With this system the heat dries the droppings, and with some additional drying this material can be used as a fertilizer. This system of brooding has the disadvantages of being more expensive to set up and more difficult to operate than the conventional hot-water system.

Light

Light intensity must be high enough to enable the poults to locate feeders and waterers but should not be so intense as to promote toe and feather picking, because these habits can lead to cannibalism. In windowless houses, light intensity can be gradually reduced as the birds grow older (Table 6). Power-saving dimming devices are useful for this purpose.

Many satisfactory lighting programs are used commercially. In a typical schedule, light is provided continuously for the first 2–3 days, followed by 23 h of light and 1 h of darkness throughout the entire growing period. The hour of darkness serves to condition the birds to the darkness that would occur if the power failed. Results from recent experiments provide evidence that changing to intermittent lighting at 8 days of age (cycles of 4 h of light followed by 2 h of darkness, 4L:2D) may be superior to other types of lighting.

Table 6. Light intensity schedule (1976)

Age, days	Intensity, lux
1-2	35
6	20
8	15
10	10
12	9
14	8
16	4
18	2
20+	1

Ventilation

Proper ventilation provides an adequate oxygen supply; keeps the carbon dioxide level low; removes dust, moisture, and ammonia from the building; and maintains suitable temperatures. Proper ventilation requires continued attention because of variations in exterior temperature.

The ventilation requirements increase as the birds mature. However, during the first week, avoid too much ventilation. A rapid rate of air change at this time is neither necessary nor desirable, because there is a danger of chilling the young poults before they have developed the ability to maintain physiological control over body temperatures.

Relative humidity

The performance of a turkey flock can be affected by the humidity level in the pen. It is important that pens do not become too damp or too dry. Optimum humidity levels reduce dust and promote better feathering and growth. A relative humidity of 60–70% appears optimum.

Sexing

Day-old sexing of poults is becoming an increasingly popular practice. When the sexes are separated the hens can be marketed at 14 weeks of age and the toms may be kept on feed for a longer period if

necessary to obtain a satisfactory finish. When marketed separately, the two sexes may be more uniform in weight. It is also much easier to control feeder and waterer heights when the sexes are raised in separate quarters.

Debeaking

Turkeys are usually debeaked to avoid cannibalism, which can result from picking. It is best done between the 10th and 28th day of age before the brooder guards are removed. Debeaking is done by shortening the upper mandible with an incision made halfway between the tip of the beak and the nostril, and searing the tip of the lower mandible. If carried out properly, it should not be necessary to repeat the procedure.

A commercial electric debeaker does the best job. Add preventive medication to the water to help the poults counteract the stress associated with the operation and its aftereffects.

In a low-light-intensity environment, debeaking should not be necessary.

Toe clipping

Toe clipping is being studied as a possible means of improving carcass quality by reducing scratching. Research results indicate that toe clipping is unnecessary in a low-light-intensity environment.

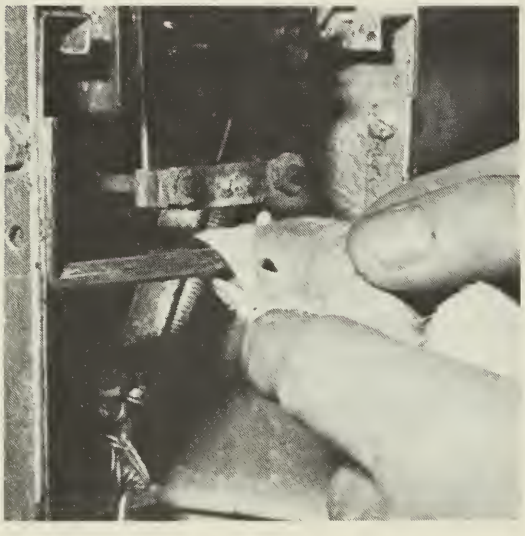


Fig. 23 Debeaking turkey poults to control cannibalism.

Fig. 24 The properly toe-clipped foot has three of the toes removed at the first joint. Note the difference between the clipped and the non-clipped feet.

Cleaning

After the turkey flock has been taken from the building, remove the litter and vacuum the dust from walls, ventilation openings, and service rooms. Switch off all nonessential electrical circuits and enclose all electrical controls in waterproof plastic, then wash the interior of the building and equipment thoroughly. Use a high-pressure sprayer and a stiff broom and scraper to remove as much organic matter as possible from cracks and crevices in the pen areas and service rooms. Be sure to use plenty of water to wash away all debris.

Disinfecting

After washing the building and equipment thoroughly, disinfect all interior surfaces of the building and all equipment with a high-pressure sprayer. Iodophors and quarternary ammonium compounds are effective disinfectants on surfaces that are relatively free from

Fig. 25 A high-pressure sprayer useful for disinfecting turkey broiler buildings.

organic matter. Coal-tar disinfectants are probably more effective on floors, where organic matter may be present. Oil-based disinfectants are a dangerous fire hazard. Shut off all electric power before spraying these dinsinfectants inside a building. As some chemicals may flavor the turkey meat of subsequent flocks, care must be taken to completely air the building after disinfecting. Follow the recommendations of the manufacturer.

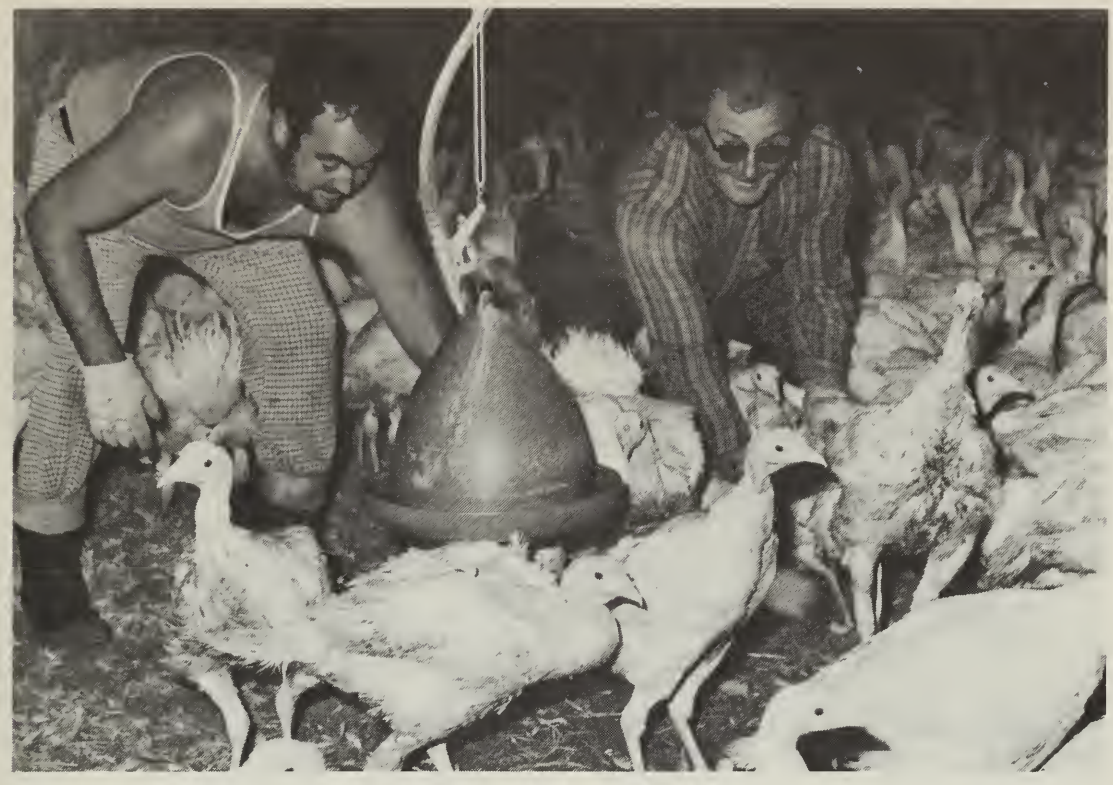
As the final step of the cleaning process, the turkey house may be fumigated with formaldehyde. Because chemical disinfectants and fumigants are extremely hazardous, obtain advice from a poultry specialist before using them. Use safety glasses, gloves, and a respirator during disinfecting and fumigating.

MARKETING AND MERCHANDISING

Most turkey broilers are marketed when they are between 12 and 14 weeks of age. Remove feed from the pen area about 8–10 h before slaughter. A shorter time period results in too much intestinal contents at time of slaughter, and a longer period without food causes extra shrinkage in carcass weight.

Because turkeys bruise easily they must be handled gently when they are removed from the turkey house for shipment to the processing plant. Make sure that the handling crews are familiar with the best methods of handling birds. Catch the flock under a blue light because the birds cannot see well in this light. The birds may have to be crated at night if the house has windows. Remove or elevate feeding and watering equipment before catching to keep the birds from being bruised during the catching exercise. Corral the birds in small groups to prevent smothering and injury. Catch and carry by both shanks, with no more than one bird in each hand. Do not force the birds into a crate or drag them over crates. Handle the crates carefully after they are filled and do not drop them. It is a good practice to have crates loaded on pallets so that they can be moved gently with a pallet hoist.

Make sure that live poultry is well protected from extreme temperatures while being trucked to the processing plant. In cold weather, this means providing shelter to prevent chilling, which can result in poor bleeding and downgrading of carcasses after slaughter. During warm seasons, the birds must be protected against overheating



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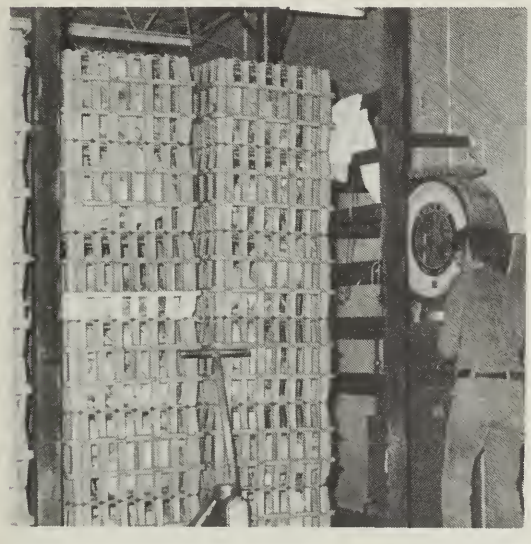

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Fig. 26 Turkey broilers must be handled gently when being caught to prevent bruising.

Fig. 27 Weighing turkey broilers in at the processing plant.

Fig. 28 After weighing, each bird is shackled to a conveying chain.

during shipment by using open crates and by trucking the birds directly to the processing plant without stops en route. At the plant, keep them under cover away from direct sunlight in an adequately ventilated area.

The slaughter and preparation of turkeys for marketing is an assembly line operation conducted under sanitary conditions. Usually, the processing procedure follows this sequence of events:

1. After unloading and weighing, each bird is shackled to a conveying chain.
2. The birds are usually rendered unconscious by an electric shock and bled by severing the jugular vein.
3. After bleeding, the birds are conveyed through a hot-water tank operated at about 61°C for about 1 min.
4. Birds are then conveyed through a rougher, which removed the feathers.
5. The carcasses then go through a special machine to remove remaining pinfeathers and cuticles. This can also be done by hand.

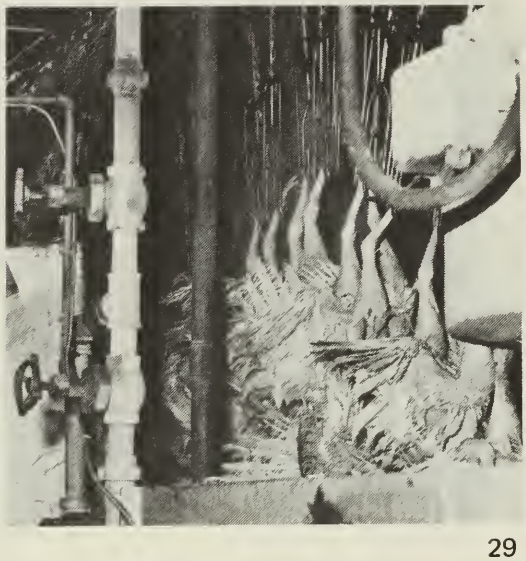

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Fig. 29 **After going through the hot-water tank, turkey broilers are conveyed through a rougher, which removes the feathers.**

Fig. 30 **Removing remaining pinfeathers by hand using a dull knife.**

On the eviscerating line, the carcasses and exposed viscera are inspected by a health inspector and kidneys, lungs, head, and feet are removed. The carcasses then pass through a cooling tank containing ice water before being graded, sorted by weight, and prepared for delivery to the consumer market.

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Fig. 31 Veterinarian inspecting the turkey broilers during processing.

Fig. 32 Turkey broilers are graded according to quality as shown in Table 7.

Fig. 33 After they are sorted and packed according to weight, turkey broilers are prepared for delivery to the consumer market.

Not all turkeys in a flock are Canada A birds. Some are downgraded into Canada B, Utility, and C. Females usually grade higher than males. A reasonable goal is to have 75% of the birds of Canada A quality. If a flock fails to meet these standards, review the entire production program and take corrective measures.

One of the main concerns of turkey growers is the number of birds condemned for human consumption at the processing plant. Condemnations may be due to mismanagement, respiratory ailment, and other disorders. All too often downgrading and condemnations are the results of bruising through mishandling of birds during catching, loading, and transporting to the processing plant. Improper bleeding, overscalding, and intestinal rupture during processing also result in condemnation. Turkey growers and processors must strive to minimize condemnations, because they represent a direct monetary loss to all concerned.

Carcass composition, quality, and flavor can be adversely affected by dietary and environmental factors. Decreased tenderness may result if growing turkeys are allowed too much floor space, or if carcasses are cut up while still warm. Turkey meat may become rancid if stored too long or kept at improper freezing temperatures.

A summary of the Canadian Standards for turkey broiler grades is presented in Table 7. These grade standards apply to turkeys sold at the retail level and are subject to change from time to time. In addition to the grades specified in Table 7, processed poultry may be graded Canada Canner if the carcass meets the requirements of processed poultry graded Canada A, B, Utility, or C, except that (a) both legs including the thighs, (b) area of skin including one-half the area of the breast, and (c) an amount of flesh not exceeding one-half the flesh from the breast, may have been removed.

Table 7. A summary of canadian standard grades for turkey broilers

Factors	Canada A	Canada B	Canada Utility	Canada C
CONFORMATION	Normal	Normal	Normal	Abnormal
Skeletal structure	Slightly crooked keel, no meat interference	Slightly crooked keel, flesh not lower than "B" at any point	Slightly crooked keel, flesh not lower than "B" at any point	Crooked keel may have meat interference
Curvature of back	Moderate	Allowed	Allowed	Allowed
Knobby keel	Slight to moderate	Allowed	Allowed	Allowed
Cysts	None	One — small, loose, and clear	One — small, loose, and clear	Allowed — no max. size, clear
Deformed back	Not allowed	Not allowed	Not allowed	Allowed
Blisters	Max. Length 25 mm	Max. Length 25 mm	Max. Length 25 mm	Allowed
FLESH	Breast — moderately plump; moderate taper Keel — maximum projection 3.2 mm	Breast — sufficient to prevent sharp falling away from keel Keel — maximum projection 3.2 mm beyond the flesh	Breast — sufficient to prevent sharp falling away from keel Keel — maximum projection 3.2 mm beyond the flesh	Breast — sufficient to prevent extreme sharp falling away from keel Keel — maximum projection 4.8 mm beyond the flesh
FAT	Breast — deposit of fat in main feather tract on breast, evidenced by pronounced thickening at center Back — sufficient fat on feather tract, from tail to hip bones, to appear smooth	Sufficient to prevent flesh from appearing through the skin	Sufficient to prevent flesh from appearing through the skin	None
FLABBINESS	Breast — slight	Allowed	Allowed	Allowed

Table 7. A summary of canadian standard grades for turkey broilers (concluded)

Factors	Canada A		Canada B		Canada Utility		Canada C
DRESSING							
Tears	Breast	Elsewhere	Breast	Elsewhere	Tears and cuts half the length of keel		Same as Grade B
weight under 5.44 kg	6.0 mm	25.0 mm	37.5 mm	50.0 mm			
weight over 5.44 kg	12.0 mm	25.0 mm	37.5 mm	50.0 mm			
Pins	Breast 5	Elsewhere 10	Breast 8	Elsewhere 16	Breast 8	Elsewhere 16	May have pins
DISCOLOR							
	Breast Total area 1.6 cm^2	Elsewhere Total area 6.5 cm^2	Breast Total area 6.5 cm^2	Elsewhere Total area 8.0 cm^2	Same as Grade B		Under 5.44 kg – 14.5 cm^2 Over 5.44 kg – 19.4 cm^2
PARTS MISSING	Wing tips		Wing tips Same as Grade A		Wings partially or completely removed. One leg with thigh, or both drumsticks removed. Tails, removed at base. Limbs, severed at joints only. Small area of flesh. Skin not exceeding $\frac{1}{2}$ area of breast		Wing tips only

FREEZER BURN	Surface desiccation, max. area 14.5 cm^2	Areas of deep-pitted desiccation, max. 14.5 cm^2	Same as Grade B	Allowed
DRIED-OUT AREAS	None	Allowed	Allowed	Allowed
BROKEN BONES	None	None	Dislocated wing and leg bones only. No broken bones	

NOTE. For further details see "Processing Poultry Regulation" published in **Canada Gazette,** 8/3/78, Part II, Vol. 112, No. 5.

DISEASES

The following diseases are the most common among turkey broilers in Canada.

Starve-outs. This disorder is the most common cause of death among newly hatched turkey broilers. Poults that do not take to feed and water shortly after being placed under the brooders dehydrate and die during the first 7–8 days of life. Often chronic infections, caused by *Mycoplasma meleagridis* or *Escherichia coli,* further contribute to losses. In general, ideal brooding conditions (adequate heat, light, feed, and water) prevent this condition.

Mycoplasma meleagridis. This chronic infection is egg-transmitted and is found in most turkey broiler flocks. Small yellowish to white lesions appear on the air sacs and lungs. Occasionally poults die, but it is more of a growth deterrent than a killer. In general, it slows the growth of the turkey, reduces feed efficiency, and increases the age to market. This infection must be eradicated before turkey broilers can reach their full potential. An antibiotic is usually injected into each poult at the hatchery.

Coccidiosis. This disease is caused by various species of *Eimeria* and affects poults 3 weeks of age and older. Poults usually continue to eat, but they huddle and cheep, and have drooping wings and ruffled feathers. Diarrhea, sometimes slightly tinged with blood, is a common symptom. The small or large intestines are usually inflamed, thickened, and dilated, and they contain milky-white contents. The caeca may contain yellowish brown material and the wall may be abscessed or hemorrhagic. This disease usually causes wet dark droppings, which produce poor litter conditions. To prevent the condition, use coccidiostats until 1 week before slaughter.

Blackhead. This disease is caused by the protozoan *Histomonas meleagridis* and can infect turkeys 3–16 weeks of age. Symptoms are droopiness, watery yellow-colored droppings, and sometimes a darkened head. Yellowish or whitish, slightly sunken circular areas are found in the liver. This symptom is usually combined with ulcers in one or both of the swollen caeca. In a few cases, only the caecal lesions appear. This disease is controlled by the use of histomonastats in the feed.

Fowl cholera. This disease is caused by the bacterium *Pasteurella multocida* and infects turkeys over 10 weeks of age. There may be a

yellow to green diarrhea, a nasal discharge, a reddish blue skin, and a swollen snood. The lungs and abdominal organs are also affected. Vaccination to prevent this problem can be carried out when the poults are 6-8 weeks of age.

Erysipelas. This disease, caused by the bacterium *Erysipelothrix insidiosa,* affects turkeys at about market age. Usually only male birds are affected. Birds infected with the disease have an enlarged congested liver, bloody areas in the breast, inflamed intestines, an enlarged mottled spleen, and often a swollen, purplish red snood. Handle birds with care, because this disease is transmissable to man. Vaccination at 6-8 weeks of age will prevent this problem.

Round heart. Round heart is a condition that affects 2-4 week old poults and is characterized by a pronounced flabby enlargement of the heart. Mortality is about 1% with occasional losses reported of 15-20%. The exact cause of this disease is not known, although certain drugs such as nitrofurans and furazolidone at high levels have reproduced the condition. Inheritance can also be a factor. Birds that survive to market age fail to grow, and at slaughter show the typical signs of the condition. There is no effective treatment.

Parasites. If proper management and clean-out procedures are carried out, there should be no parasitic problem in the turkey broiler flock.

Preventing disease

Some suggestions for the prevention of disease:

- Obtain stock that is as free from disease as possible.
- Grow turkeys separately from other poultry.
- Control rodents and flies.
- Prohibit nonessential visitors.
- Minimize movement of trucks.
- Check daily for sick and injured turkeys.
- Dispose of dead birds immediately by incineration.
- Contact your provincial poultry veterinarian, local veterinarian, or the poultry division of your provincial department of agriculture if you think that you have a disease problem.

Disease prevention depends on good management practices, yet despite all precautions, a disease outbreak may occur. If it does, obtain a proper diagnosis quickly.

SUMMARY OF PERTINENT POINTS

- Obtain good-quality poults of known parentage.
- Practice isolation brooding, particularly at 1–10 days of age.
- Establish brooding temperature 48 h before poults are due to arrive.
- Check your thermometers in water to ensure that they are accurate.
- Spread waterers and feeders evenly throughout the brooding area.
- Expose birds to water and feed as soon as possible.
- Ensure that all poults have found water during the first 24 h.
- Wash and disinfect waterers two or three times a week.
- Keep feed waste to a minimum by maintaining feeders one-third full and by adjusting level of feed to the back height of poults.
- Do not vaccinate or medicate unnecessarily.
- Use special care with fumigant chemicals and disinfectants, because they can be extremely hazardous.
- Check for fire hazards and ensure that the caretaker has an escape route.
- Have your alarm system set to warn you in the event of a power failure or of unusual temperatures.
- Check and start up your auxiliary power unit periodically. Have a container of extra fuel available.
- Provide for emergency ventilation in the event of a power failure.
- Debeak if necessary.
- Watch for sick birds and obtain a prompt diagnosis.
- Use a sanitary method for the disposal of dead birds.
- Remove feed from the flock 8–10 h before slaughter.
- Take special precautions to prevent bruising when catching turkeys for shipment to the processing plant.

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CONVERSION FACTORS

Metric units	Approximate conversion factors	Results in:
LINEAR		
millimetre (mm)	x 0.04	inch
centimetre (cm)	x 0.39	inch
metre (m)	x 3.28	feet
kilometre (km)	x 0.62	mile
AREA		
square centimetre (cm^2)	x 0.15	square inch
square metre (m^2)	x 1.2	square yard
square kilometre (km^2)	x 0.39	square mile
hectare (ha)	x 2.5	acres
VOLUME		
cubic centimetre (cm^3)	x 0.06	cubic inch
cubic metre (m^3)	x 35.31	cubic feet
	x 1.31	cubic yard
CAPACITY		
litre (L)	x 0.035	cubic feet
hectolitre (hL)	x 22	gallons
	x 2,5	bushels
WEIGHT		
gram (g)	x 0.04	oz avdp
kilogram (kg)	x 2.2	lb avdp
tonne (t)	x 1.1	short ton
AGRICULTURAL		
litres per hectare (L/ha)	x 0.089	gallons per acre
	x 0.357	quarts per acre
	x 0.71	pints per acre
millilitres per hectare (mL/ha)	x 0.014	fl. oz per acre
tonnes per hectare (t/ha)	x 0.45	tons per acre
kilograms per hectare (kg/ha)	x 0.89	lb per acre
grams per hectare (g/ha)	x 0.014	oz avdp per acre
plants per hectare (plants/ha)	x 0.405	plants per acre