Table 1. (Continued) Anticoccidial drugs used in the poultry industry.

Chemical group (approx. dose, ppm[a]); relevant information	**Non proprietary name**, *brand name (manufacturer, company); other information	**Characteristics**[b] and miscellaneous comments
Carbanalide derivatives (100–125) [c8]1955	[c8]**nicarbazin** (Coffolk, Israel)(equimolar complex of dinitrocarbanilide and dimethylpyrimidinol) *Nicrazin *Nicarb (Merck, Sharp, and Dohme →MSD AgVet, now Merial, other distributers)	first drug with "broad-spectrum" activity against *Eimeria* spp. in chickens and the most effective of the older drugs; it shows synergistic effect with polyether antibiotics (see: combination with **narasin**); its action is directed against developing second-generation schizonts; it is licensed for use in broiler chickens only and still has wide application in the poultry market, especially in shuttle programs (starter feed only) in winter or cooler month; for that reason resistance of coccidia to nicarbazin is not yet widespread; there may be problems with side effects – it can cause increased sensitivity to heat stress during summer which results in growth depression and mortality in broilers; it may be used in replacement pullets (125 ppm, up to 6 weeks of age); the drug should not be fed to (laying) hens because of toxic side effects (reduced hatchability, interruption of egg laying); mortality may be caused by cell degeneration processes in liver and kidneys; its mode of action, and thus mechanism of selective toxicity, seems to be unknown in coccidia
NITROFURANS		
recommended dose levels may vary: (50), preventive use; (120), therapeutic use [c9]1948 [§]not licensed for prevention of coccidiosis in poultry or other animals under European Commission Guidelines (additives in feeding stuffs), and feed regulations of Food and Drug Administration (FDA) in the USA	[c9]**nitrofurazone** (**nitrofural**) **furazolidone** **furaltadone** *various (various manufacturers)	possess antimicrobial and limited coccidiostatic activity; **nitrofurazone** affecting second-generation schizonts of *E. tenella* and *E. necatrix* has also been used for control of coccidiosis in lambs and goat kids; **furazolidone**, which has been used for treating established infections and preventive control of coccidiosis, produces neurologic symptoms at higher concentrations (400 ppm) when fed in combination with either dinitolmide (1–5 ppm) or amprolium (125 ppm); it has also been administered to chickens, turkeys, and swine for control (shuttle programs only) and treatment of various digestive tract infections (bacterial enteritis, dysentery, giardiasis); **furaltadone** has been applied successfully for treatment of *Salmonella* and *Mycoplasma* infections in chickens; toxic and chemical properties of nitrofurans have restricted their widespread use; nitrofurans are suspected to be carcinogenic, and in many countries there are activities against this series of compounds
Thiamine analogues (62.5–125 and higher doses) [c10]1960	[c10]**amprolium** (all products MSD Agvet, now Merial)	**amprolium**, and **amprolium+ethopabate** (feed additives) are licensed for use in chickens, guinea fowl, and turkeys for prevention of coccidiosis; active on *E. tenella* and *E. necatrix* (to a lesser extent against *E. maxima*) of chicken and pathogen *Eimeria* spp. of turkeys ; activity is directed against first- and second-generation schizonts (coccidiostatic at lower, coccidiocidal at higher doses). Amprolmix may still be used chiefly in turkey poults because of its good tolerability and allowing development of immunity needed after withdrawal of the product (in replacement layers/poults up to 10–16/8–10 weeks of age); amprolium resistance in replacement pullet farms is a problem and limits its use; **amprolium+ethopabate** have been combined with sulfaquinoxaline, and pyrimethamine to extend their activity spectrum and to improve efficacy against amprolium-resistant Eimeria spp. strains; these combinations have been discontinued in some countries because of residue problems; they have also been used therapeutically; **amprolium** probably acts by inhibiting thiamine uptake by parasites; this vitamin (thiamine pyrophosphate) is a cofactor of several decarboxylase enzymes playing a role in cofactor synthesis; amprolium cannot be pyrophosphorylated (lacks hydroxyethyl group); **ethopabate** (an arylamide containing one phenyl ring, belonging to monocyclic aromatics) is a very safe drug, and a competitor of PABA for absorption by the parasite;
*(66.5–133)	**amprolium** (25 parts)+**ethopabate** (1.6 parts) *Amprolmix Premix	
**(165→100+5+60)	**amprolium** (18 parts)+**ethopabate** (0.9 parts)+**sulfaquinoxaline** (10.8 parts) **Pancoxin (discontinued in some countries)	