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High rat pup mortality attributed to the use of cedar-wood shavings as bedding

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During a study of dietary effects on reproductive efficiency in female rats, high mortality among the sucking pups was observed in both control and experimental groups. This mortality was attributed to keeping the pups on a bedding of highly aromatic cedar-wood shavings. The experiment described demonstrates this effect and warns of the hazards in raising rat pups on a bedding of cedar-wood shavings. Pick & Little (1965) have shown that keeping rats on a bedding of cedar-wood shavings affected the thresholds of response to pentylenetetrazol, but no studies of the effects of such bedding on pup growth and mortality have been reported. The present experiment also describes the suitability of rat bedding materials consisting of ground corncobs and shredded aspen shavings. In a later study, bedding made from hardwood chips ('Betta Chip'; Northeastern Products Corp., Old Route 9, Box 277, Warrensburg, Pennsylvania 12885, USA) was also found to be highly satisfactory.

Methods

16 virgin Sprague-Dawley female rats, aged 91 days, were mated to 16 males of same age and strain. Each pair was housed in a stainless-steel wire-bottom cage for at least 2 weeks, and all were fed a commercially available pelleted diet ('Lab-Blox'; Allied Mills Inc., 110 North Wacker Drive, Chicago, Illinois 60606, USA) ad libitum. The animals had free access to water and were kept in a room with a 14 h light:10 h dark cycle, with temperature regulated at 22°C. As parturition approached, the females were placed in individual clear plastic 'shoebox' cages with ground corncob bedding ('San-I-Cel'; Paxton Processing Co. Inc., Paxton, Illinois 60957, USA). The diet was as before except it was ground, placed in open-topped clear feeding jars, and was available only during 8 h of daylight each day. At parturition, the pups were counted, sexed and weighed. The pups and dam were placed in a new 'shoebox' cage containing as bedding either ground corncobs, aspen shavings (American Excelsior Co., 1111 North Dupage, Lombard, Illinois 60148, USA), or shavings from the red cedar juniper, *Juniperus virginiana* L. (Aromatic Cedar Products Inc., Gainesville, Missouri 65655, USA). The assignment of the bedding material was on a sequential basis in order of parturition. Fresh bedding was provided each week. As 2 of the dams did not conceive and 1 other gave birth before transfer to a 'shoebox' cage, 13 litters were studied. Each dam was fed a semipurified diet developed for lactating rats (Simons & Johnston, 1976); the diet was provided in food jars and was available only during 8 h of daylight each day.

Results and discussion

Table 1 summarizes the results of the study. Pups raised on cedar-wood shavings showed 60% mortality compared to less than 3% for those raised on corncobs or aspen. It can be seen that higher mortality was evident by a week and was most marked between 1

Table 1. Mortality and bodyweights (means ± standard deviations in grams) of rat pups raised on different beddings

	Crushed corncobs	*Shredded aspen*	*Cedar shavings*
Number of litters	5	4	4
Live pups born	47	40	48
Pups dead by 1 week	0	0	5
Pups dead by 2 weeks	1	0	27
Pups dead by 3 weeks	1	0	28
Pup weight at birth	6·5 ± 0·5	6·6 ± 0·5	6·4 ± 0·4
Pup weight at 1 week	17·2 ± 2·6	16·6 ± 1·3	11·2 ± 2·3*
Pup weight at 2 weeks	30·2 ± 4·8	30·6 ± 2·7	23·4 ± 5·6*
Pup weight at 3 weeks	45 ± 8	47 ± 6	37 ± 10*

* Difference between cedar and other beddings was significant at $P < 0·001$.

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week and 2 weeks of age. It should be noted that the dams were first exposed to the cedar-wood on the day of parturition; in previous experiments, when dams were placed on cedar a week prior to parturition, mortality of pups was more precipitous than in the present study. Moreover, the pups raised on cedar-wood bedding did not grow as well as those on other bedding. By 3 weeks of age the pups that survived on cedar-wood weighed less than 80% of the others (Table 1). Decreased pup weight was apparent in those raised on cedar-wood shavings at the end of the 1st week before pup mortality was pronounced.

The basis for the reduced weight gain and increased mortality of pups raised on cedar-wood bedding is not known. It appears that the pups were ingesting or inhaling a compound which was toxic to them. The possibility exists that it may have been transferred in the dams' milk. In any event, investigators should be alerted to this hazard of aromatic cedar-wood shavings in reproductive studies with rats and, perhaps, other species of laboratory animals.

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References

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